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EDUCATION
primary problems of the technology National Curriculum



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REVIEWS
games, Arc video digitiser, ArchiTeX Premier, Instigator and Chaos



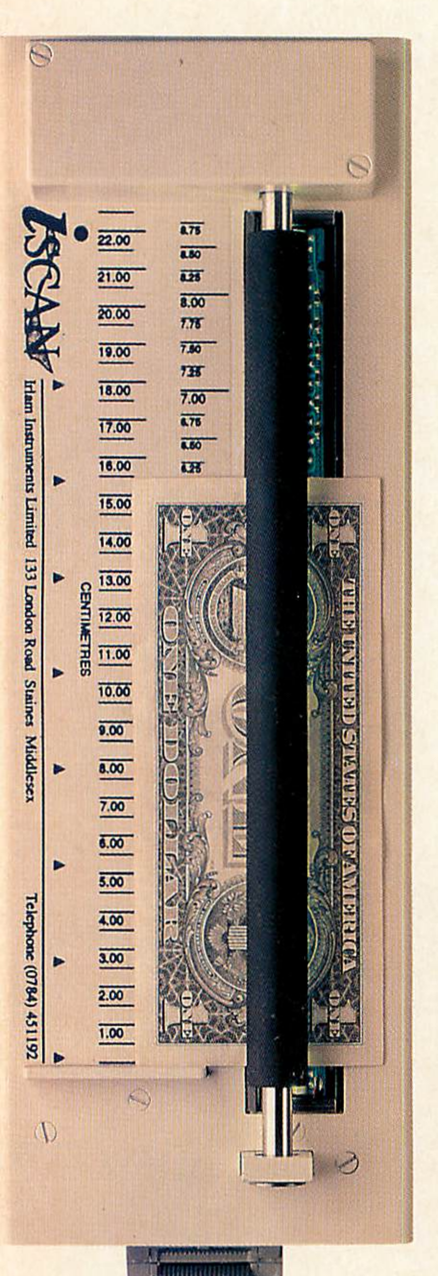
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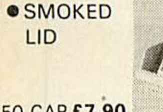
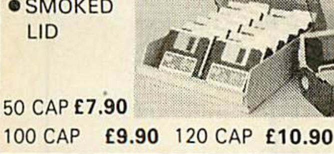
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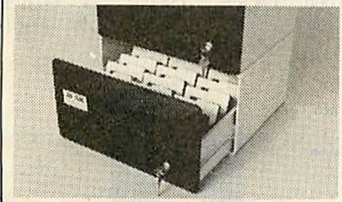
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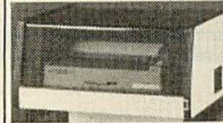
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HQP 40 (Colour)	H0103	£265	FR10	H0003	£370
PANASONIC			**NEC**		
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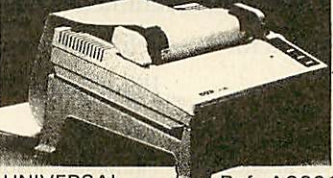
All parallel buffers have 36 pin female connectors as standard

PRINTER CONTROL CENTRE

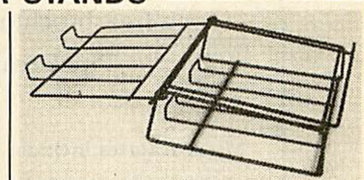
• SOFTWARE DRIVEN • KEYBOARD CONTROL

	Ref.	256K	Ref.	512K	Ref.	IMB
2 INPUTS/2 OUTPUTS	X0300	£285	X0302	£425	X0304	£730
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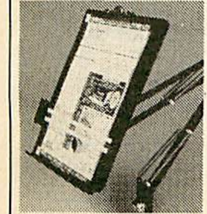
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25 PIN MALE/25 PIN FEMALE	A0805	£8.50
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KEYBOARDS

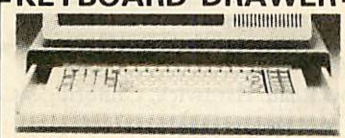
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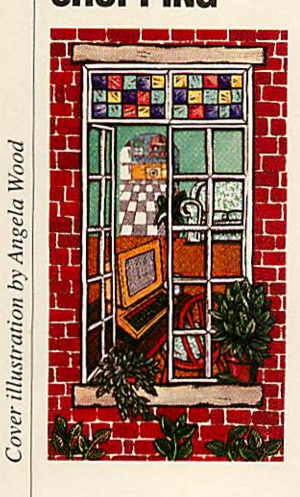
IBM PC XT/COMP	2PC	C0110	£9.50
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*Please specify printer

BBC ACORN USER

JULY 1990 ISSUE No 96

64
WINDOW SHOPPING



Cover illustration by Angela Wood

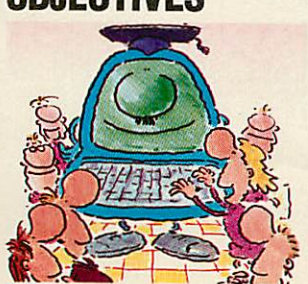
120
BIRDSEYE VIEW



126
ALL IN ORDER



78
PRIMARY OBJECTIVES



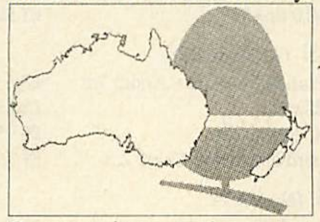
DELPHI LISP ON SHOW

Acorn R140 Unix workstations recently featured at Europal, the first European Conference on applications of Lisp. The workstations were used in workshop sessions running Delphi Common Lisp, and as one of the event sponsors, Acorn provided workstations for tutorial and advanced workshop sessions.

ACORN ENTERS THE LAND OF OZ

Acorn has announced that it is to set up a sales and marketing operation in Australasia.

Following a fact-finding mission by Acorn's MD Sam Wauchope in February, Acorn is seeking the acquisition of Acorn's existing distributor, Barson Computers Australasia, and its New Zealand subsidiary.



Commenting on the move, which has been planned for the past two years, Wauchope said; 'Australasia has always been important to us, and we are underlining our commitment to our existing customers as well as opening up new business possibilities. We are also keen to market the expertise of the many independent software and peripheral developers.'

Acorn has had a presence in Australasia since 1983, and is the only computer manufacturer whose products are recommended by all Australian state education authorities.

Acorn is on (0223) 245200.

NEW RISC OS IN '90

Acorn is developing a substantially enhanced version of the Risc OS operating system used on the Archimedes range and the A3000.

BBC Acorn User understands that the new version will be launched next year.

The new 2Mb Risc OS will be supplied on four 4Mbit Rom chips and will include enhanced versions of *!Draw*, *!Edit* and *!Paint* in the Rom.

Other additions include multi-tasking versions of ADFS, RamFS and SCSI filing systems which allow copying and backup as a 'background' task while other programs are used.

The desktop has been enhanced in several ways, including new menu options, greater help facilities and the ability to define which program is run when the machine is turned on.

A complementary option allows the user to save the status of an application and desktop settings when the machine is turned off.

Also included is a new applications directory icon which will allow the user to run applications which are held in the firmware.

As well as the three major applications, an improved version of Basic which supports higher precision maths and co-processor support, a number of fonts and a dot-matrix printer driver will also be included on the Rom.

All three standard applications have been improved. *!Edit* incorporates auto-reformatting of columns, *!Draw* now features interpolation and has numerous keyboard short-cuts as well as the ability to auto-scroll a window when dragging the mouse – like *Impression.*

!Paint now features the ability to shear a sprite and all three applications will now use extra sprite routines such as scaling, mode translation, and dithering when changing down to a lower screen mode.

The version of Risc OS will be supplied as standard with the new machines that Acorn plans to launch next year.

An upgrade option priced between £80-£110 will be available for all Archimedes machines, including the A3000 and 300 series.

The latter will need to be modified slightly in order to take the larger Rom chips but some peripheral manufacturers have already been briefed about this.

Acorn is keeping exceptionally quiet about the whole matter and *BAU* understands this is at least partly because the list of modules to be included in the new Risc OS has not been finalised.

David Janda

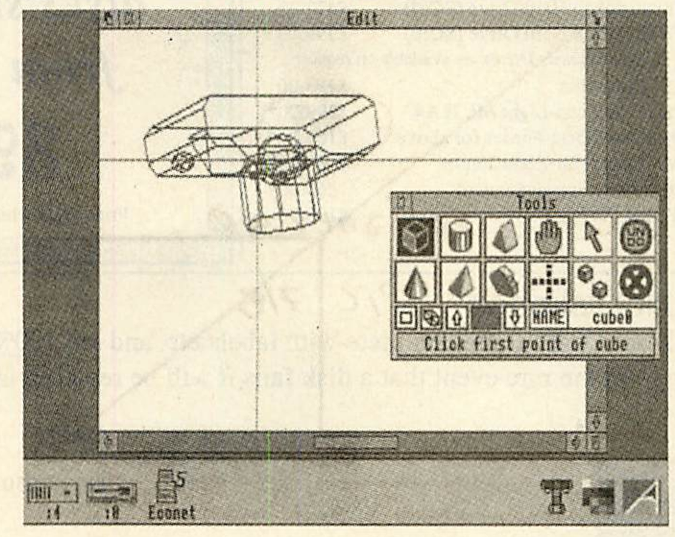
TAB YOUR DESIGNS

Devon-based Tap Consortium has released *Tabs*, a 3D modelling software package on the Arc.

Tabs allows outlines of 3D objects to be designed on-screen, and then printed in a form that allows the paper to be folded into the desired object.

The model is printed together with folding tabs, on any printer supported by the Risc OS printer drivers. The files produced by *Tabs* are *!Draw* compatible, and can be loaded into packages such as Arcol for detailed design work and colouring.

Tabs costs £57.50 for a single machine version, or £280 for a site licence. Tap Consortium is on (0822) 613868.





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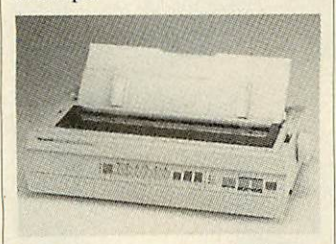
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PANASONIC PRINT WIDE

Panasonic Business Systems has updated its range of dot-matrix printers with the introduction of a 24-pin, wide column model costing £525.

The KX-P1624 comes with five resident fonts in a variety of print sizes.

Panasonic claims the unit has a draft printing speed of 192cps, and letter quality printing at 63cps.



The unit can accept stationery from the rear, front or bottom with push and pull tractors, and incorporates single sheet feeding, paper parking and zero tear-off facilities.

Other features include IBM and Epson emulations and a 12K text buffer.

Panasonic is on (0344) 853550/1/2.

BEEB CONTROL ON AN ARC

Aberdeen-based Science Frontiers has launched a dual port expansion card for the Archimedes 300 and 400 series.

At £97.69 the podule has two eight-bit bi-directional input/output ports and two hardware timers using the 65C22 VIA.

The podule provides two BBC micro compatible user ports, and can be used to control a variety of existing external devices or user-constructed ones in the same way as the BBC micro.

The dual-port podule can be used from Basic, C, Arm using SWI calls or Sheila OSBytes *FX 150/151. Routines to control the device are supplied on Rom.

Science Frontiers is on (0224) 642765.

R140 APPLICATIONS MADE EASY



A portable application development tool which runs under a variety of operating systems has been ported to the Archimedes.

Dataflex, from the company of the same name, combines a database with the speed and flexibility of a fourth-generation language. It was demonstrated at the *Which?* Computer Show in April, and will run on an Acorn R140 Unix workstation.

The package can be used to create a flat file database or customise applications using relational database techniques.

Because the package was written with a 4GL, it can be used by inexperienced users without any training.

According to the authors, *Dataflex* has been used to create hundreds of applications, many of which have been sold in their own right. (Dataflex Ltd produces a catalogue listing these applications.)

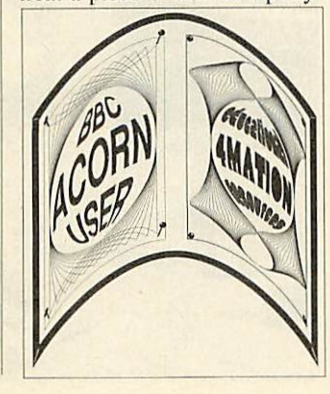
Dataflex is on 071-729 4460.

A PUT UP JOB

Education specialists 4Mation is currently putting the finishing touches to what it claims will be the third stage in electronic publishing.

The first stage was the wordprocessor. The second was DTP, and the third is *Poster*.

Poster features the ability to treat a piece of text as a putty-like object which can be squeezed, stretched and distorted. Text, or any type of Draw file can be placed into what could be called a 'mould'.



The border facility allows borders to surround any object, or group of objects, and a number of decorative borders are supplied as standard.

Documents can vary in shape, and if they are larger than the printer can handle the document is printed with thin marks showing where to cut.

Poster costs £102.35 with 20 outline fonts, or £73.60 without.

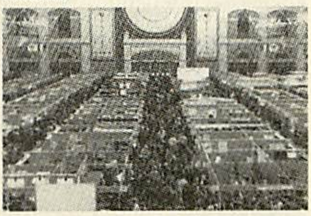
Poster will work with any printer if a Risc OS driver is available and any package which reads Draw files will import *Poster* documents.

4Mation can be contacted (0271) 45566.

SHOPPER SHOW MOVE

The *Computer Shopper* Show, which is to be held from December 6-9, has moved to a new location.

This year the show will be held in the Wembley Conference Centre where the organisers Blenheim Database Exhibitions, expects 50,000 people to attend.



Last year 3,000 visitors had to be turned away from the show at Alexandra Palace, and appeals were made on local radio for people not to turn up due to overcrowding.

RISC OS ECONET TELETEXT SERVER

Econet specialist XOB has released a Risc OS teletext server for the Archimedes range for £235.75.

TSERV-RISC runs as a multitasking application within the desktop environment of an Archimedes or A3000.

The software is capable of sending teletext pages to BBC model B, Master or Archimedes micros stationed on the network.

The server can accept requests from any terminal software running on any Econet station.

Pages are downloaded from a Morley teletext adaptor connected to a host computer, and requests from many stations can be accepted simultaneously as a queuing system is used.

The server is a full Risc-ware application and so the computer running it may also be used for other applications at the same time. XOB is also selling the package without the adaptor for £100.

XOB is on 032-784 364.

NEWS IN BRIEF

- Two new graphic packages are available for the Archimedes range for users in higher education, engineering and research.

FAM from FEGS in Cambridge provides finite element modelling pre- and post-processing.

Two *FAM* packages are currently available; *FAMbuild* for modelling and analysis, and *FAMresult* for display and graphical presentation of results.

GINO from Intelligent Interfaces has been implemented to run under Risc OS, using high-resolution colour modes. It comes as three modules. Details from Acorn on (0223) 245200.

- Panasonic has released the KX-P4420 laser printer at £1604.25.

The unit has a print speed of eight pages per minute, and is compatible with HP Laserjet Series II software.

Two font card slots allow the use of a selection of optional fonts. Panasonic is on (0344) 853552.

- Apologies to Morley Electronics for reporting in the June issue that the company's User Port podule costs £9. In fact it costs £48.

DIARY DATES

9-11 July. Acorn Networks '90 – fifth computer networking conference, Keele University, Staffordshire. Contact: Sarah Scott on (0223) 245200.

20-22 July. British Music Fair, Olympia, London. Contact: Westland Associates on 071-730 7852. Will display music software.

7-9 September. *BBC Acorn User* Show, Westminster Exhibition Centre, London. Contact: Safesell on (0737) 814084.

25-28 September. Business Computing '90, Earls Court, London. Business and trade exhibition only. Contact: Montbuild on 071-486 1951.

UNIX GOES FREELY TO STAFFS POLY

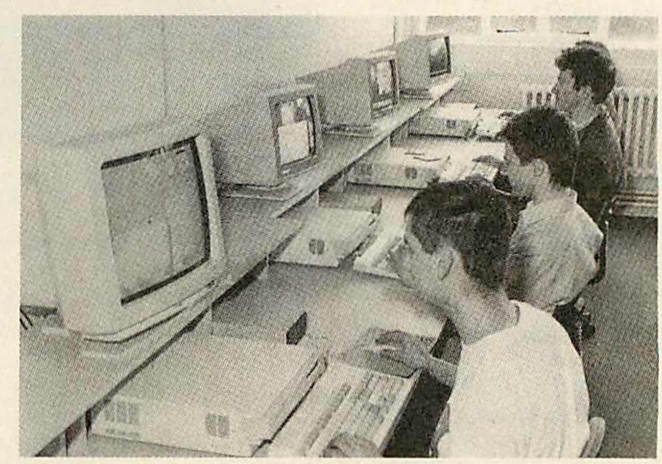
Acorn Computers and Crewe based Acorn dealer 3SL have donated 10 R140 Unix workstations to a new laboratory in the computing department of Staffordshire Polytechnic.

The poly has one of the largest computer science departments in the UK with 80 staff and 1000 students.

The department is the largest in the polytechnic and provides courses for a wide range of computer science and business management studies.

The new R140 workstations are the first Risc-based machines at the polytechnic which run the Unix operating system.

The machines will be used for many applications, one of which will be to teach students about high-speed Risc computing architecture, now adopted by most major manufacturers.



The 10 R140 workstations are networked together using standard Ethernet communications and provide access to the department's mainframe computer. This allows students to work individually while also gaining experience of programming and operating networked systems.

FAREWELL AND WELCOME

It's with a great deal of sadness that the staff of *BBC Acorn User* bid farewell to the editor, Geoff Bains and to the technical editor, Rob Miller.

Geoff joined *BAU* in early 1989 from editing *Electronics Today International*.

A keen Beeb enthusiast for many a year, Geoff put his unique touch of individualism to the mighty tome you hold before you now.

Ever since he liberated a spare dish from Jodrell Bank, Geoff has set his sights on higher things, and so leaves us to become editor of *What Satellite* – a wire-head's alternative to *The Sky at Night*.

When asked why he was leaving Bains said; 'I need a break from computing.' This we know to be a pack of lies, as he's marked himself down for a load of reviews.

All that is known about Rob Miller's past is that he was a good deal tidier when he joined than when he left three years later. Rob escalated to the dizzy height of technical editor (and other transcendental planes) through hard work (see photo), good humour, CDs, comics and other nefarious methods which we are not allowed to describe. Rob leaves to become a full-time Kent-based country mouse, and intends to earn the occasional crust by freelance writing and computer programming.

Replacing Rob is Paul James who joins the team as technical assistant. Paul comes from the Isle of Wight and he's a wire-head of the first magnitude, and is just as tidy as Rob was three years ago – welcome aboard!



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HIGH PERFORMANCE COLOUR INK JET PRINTER

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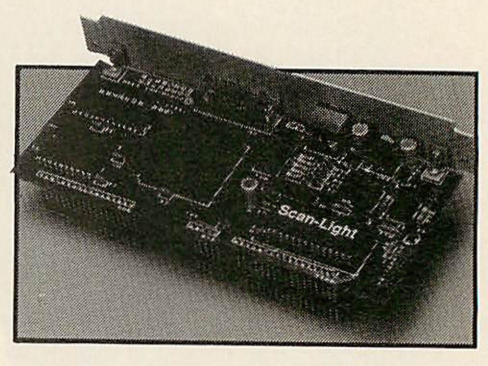
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S·C·A·N·LIGHT

SCAN-LIGHT 3000

Scan-Light 3000 is the only scanner designed specifically for the Archimedes A3000. The package consists of an internally fitting expansion board, power supply, software on board and a 400 dpi hand-held scanner.

Since the fully RISC OS compatible software is supplied in ROM on the expansion board, it can be started without the need to load anything from disc - it is always instantly available. The software is simple to use and has many advanced features; • Choice of monochrome or grey-scale scans • Scan resolutions of 100, 200, 300 or 400 dpi. • Unique grey-map control allowing total control over the brightness and contrast after the picture has been scanned (there is also a brightness control on the scanner). This even allows pictures to be inverted (you can scan photographic negatives) • Image manipulation facilities for picture smoothing and enhancement • Integration with other RISC OS applications allowing pictures to be transferred directly to other programs, such as Paint, Draw, Impression etc.



The Archimedes is a computer that can handle both graphics and text with equal ease, and Scan-Light is the best way to obtain pictures for the computer - ideal for capturing photographs, artwork or graphics of any sort.

£189.00 + VAT (£217.35 incl.)







Computer Concepts Ltd

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MORE MIDI MAYBE

In anticipation of the day when we are all using our computers to make MIDI music, it's worth remembering that MIDI was initially developed only to allow one keyboard to talk to another.

Musicians' demands, programming ingenuity and expectations of the system have far exceeded its original intentions.

However, the IMA (International MIDI Association) is considering further developments to the system and has polled its members to ask their opinions on 14 possible new enhancements.

As a taster, we've jotted down a number of the more interesting ideas:

- The ability to send standard MIDI files over MIDI.
- The ability to send Ascii over MIDI (for remote naming).
- The ability to request a System Exclusive dump from an unknown synthesiser.
- The ability to switch between cartridge, disc and internal memory.
- Agreement on generic registered parameters for things like velocity sensitivity.
- The ability to order a synth to save a voice into a specific memory location.
- The ability to remotely control every front panel function via MIDI.

The IMA also asked how important MIDI implementation was when purchasing new hardware and software.

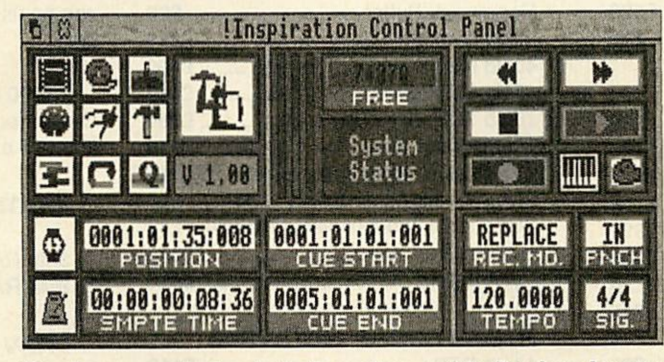
This is a very good question indeed as I suspect most synths are bought purely for their sound with the assumption that they will 'work fine' via MIDI.

However, as the list indicates, users are becoming increasingly aware of MIDI's limitations. Manufacturers are beginning to implement functions in non-standard ways and if this practice continues it can only lead to confusion.

The problem is that if MIDI were to be designed now from scratch, it would be quite a different system to the one that we know.

But as so much investment has already been put into the present system, no one can afford to dispense with it and, in the process, make millions of pounds worth of hardware and software obsolete.

So it looks as though the MIDI we know is here to stay and enhancements – may they soon appear – will have to fit into and around the present protocol.



My sincere apologies to both readers and to Pandora for any misleading information which has appeared in this column. In spite of many declarations, assertions, prognostications and promises, the !Inspiration software has not yet appeared. By the time you read this...

Rest assured, I will write not one more word of it until I have a copy in my sticky fingers.

Meanwhile perhaps you'd like to contact the real culprits: Pandora Technology can be found at 9 St Marks Place, London W11 1NS. Tel: 071-221 9653.

AMPLE BBC REPEATS

Michael Harbour has written to remind us of a useful Ample technique to use when programming chord accompaniments. It's to use X to restrike a note or a chord. For example:

```
C(EG) X(XX) X(XX)
```

will play:

```
C(EG) C(EG) C(EG)
```

If you define a strike word and an off word as follows:

```
"x" [ X(XX) ] "y" [ ^(^^) ]
```

then it enables you to write accompaniment patterns quite economically.

Last year Michael released an Ample album through Hybrid Technology called *Shivering Again*. He has followed this with a new album called *Ashes*, available for £4.95 from Hybrid Technology, 273 The Science Park, Cambridge CB4 4WE. Tel: (0223) 420360.

This month the yellow pages section contains a listing of a piece of music from *Ashes* (courtesy of Hybrid Technology) called 'Meanwhile Here Is Some Music' which uses this technique.

If you are experimenting with chord accompaniments don't forget the power of the strum or broken chords!

This can add extra life and depth to an accompaniment and is especially effective with piano and guitar sounds.

You can delay the onset of the notes in the brackets of a chord to produce a strum by adding a length setting just before them.

For example:

```
C(4,EGC)
```

In true Ample fashion you can also create a negative strum:

```
C(-4,EGC)
```

Don't forget, as each note plays on a different voice you can give each a different instrument, volume level and pan setting.

Ian Waugh

NEWS IN BRIEF

- Clares, of *Armadeus* fame, is developing a new music program for the Arc. *Rhapsody* will record music in real-time from a MIDI keyboard and convert it to standard music notation.

You can also use *Rhapsody* to play back the music via MIDI or through the Arc's own sound system. It should be available some time later this year.

- Amplinex member John Bartlett, famous for *Jazz Discs*, has a new album. *Impressions* has eight tracks in varying global styles, realised in Ample, in John's familiar style. It costs £3.50 from JS Software, 20 Crawley Avenue, Wellingborough, Northants NN8 3YH.
- Armadillo's A-616 Sampler for the Arc is now available. Powerful editing features include reverse, fade in and looping. The 16-bit version is £1489.25 with an 8-bit version available at £189.75 or £195 with MIDI. Armadillo is on (0727) 5075.
- Greenweld, the electronic components company, has acquired three music programs for the BBC from AB Marketing. They are being sold at around a quarter of the original price.

The Mupados *Recorder Tutor* (£7.95) is well-known in education circles. *Music Master* (£14.95) is another recorder tutor with on-screen notation. The *Micro Maestro* pack (£4.95) has six backing tracks on a cassette with music displayed on screen to be played. Greenweld are at 443 Millbrook Road, Southampton SO1 0HX. Tel: (0703) 772501.

If you have music news, tips or topics you'd like covered write to Ian Waugh at BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ. I'd particularly like to hear of music projects using the Archimedes.

Computerware

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Archimedes 410

Item	Price
Archimedes 410/1	£1099
1Mb RAM for 410	£69
3Mb RAM for 410	£199
20Mb hard drive (fast)	£199
40Mb hard drive (fast)	£349
50Mb hard drive (fast)	£479
SCSI card (Acorn)	£269
SCSI card (CW)	£169
Floating point unit	£529
Midi card	£65

Archimedes 3000

Item	Price
Archimedes 3000 base unit	£599
A3000 'The Learning Curve'	£699
A3000 + colour + plinth	£779
1Mb RAM expansion	£139
3Mb RAM expansion	£399
20Mb hard disk (CW)	£399
Plinth (PRES)	£24
Serial upgrade	£19
User & Midi podule	£46
Floppy disk buffer	£26
Internal SCSI card	£169
external SCSI podule	£169
Colour TV Modulator	£26

Extras

Item	Price
Mouse mat	£5
Keyboard cable extender	£6
Printer lead	£8
Floppy discs (10boxed, TDK)	£14
Special leads (made to order)	£10

Monitors

Item	Price
Acorn Colour	£199
Philips Colour	£180
Eizo 9060-SZ multiscan	£465

Books (no VAT)

Item	Price
Acorn PRM	£79
C: A Dabhand Guide	£14
BASIC V: A Dabhand Guide	£9
Archimedes Assembly Language	£14
Archimedes Operating system	£14
BBC Basic Guide (Acorn)	£19
A3000 Technical Manual	£29
Econet Advanced User Guide	£5
Econet level 3 manager's Guide	£5
Archimedes First Steps	£9

Upgrades

Item	Price
Aleph One ARM3 30MHz	£579
MEMC1a	£50
Atomwide APEC	£33
Atomwide VIDC enhancer	£26
Acorn I/O v2	£80
Acorn FPU	£529
A410/1 replacement floppy drive	£69
A300 replacement floppy drive	£69
Floppy disk Buffer	£26
20Mb hard drive (fast) for 300	£369
40Mb hard drive (fast) for 300	£499
45Mb SCSI drive only (18ms)	£499
75Mb SCSI drive only (18ms)	£599
105Mb SCSI drive only (18ms)	£749
210Mb SCSI drive only (18ms)	£1149
External casing for above add	£60
SCSI podule bought with drive add	£49
1Mb RAM for A310	£345
3Mb RAM for A310	£520

Archimedes Software

Item	Price
Acorn DTP	£119
Impressions (CC)	£139
Pipedream 3	£129
ANSI C v3	£139
ISO Pascal	£139
PC emulator	£99
First Word Plus	£69
C-Front	£17
Disc-Tree	£39
Pro-Artisan	£89
Artisan 2	£49
Render Bender	£59
Interdictor	£28
Twin editor	£27
Font Starter Pack (for DTP)	£39
Newhall Font Pack (for DTP)	£39
Autosketch	£79
Hearsay	£56
UIM	£26
E-Type	£17
White Magic	£17
Presenter II	£37
Flying Start II	£79
Oak PDT (CAD system)	£320
RISC OS Companion	£49
Genesis	£82
Disc sharer (Econet only)	£134
Printer Spooler (Econet only)	£79

Printers

Item	Price
Panasonic KXP4450i laser	£1345
Panasonic KXP 1124	£249
Star LC10	£159
Star LC2410	£259
Printer Lead	£8

Specials

A310 RAM upgrades come complete with a MEMC1a. Prices include courier collection and delivery after fitting and testing at our premises.

A410/1 computers purchased at prices shown come with £110 credit (ex VAT) which can be used for further purchases at the same time.

A3000 computers (including The Learning Curve) receive a BBC BASIC guide and serial kit at no extra charge.

Coming Soon

3Mb RAM for A3000
8Mb RAM for 410/1

New A3000 Learning Curve

The new Learning Curve pack contains an A3000 computer, demonstration video, application suite discs, 1st Word Plus wordprocessor with spelling checker, PC Emulator, Genesis, Genesis applications and a Parents' guide to the National Curriculum

A310 = A440/1 ?

With the Computerware conversion kit for the A310 you get the following features ->

- ✔ MEMC1a
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- ✔ 2Mb or 4Mb total memory (upgradable)
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Item	Price
2Mb & 20Mb	£659
2Mb & 50Mb	£879
4Mb & 20Mb	£835
4Mb & 50Mb	£1055

Econet

Item	Price
Econet module	£49
Lead set 10 station	£35
Econet starter kit	£86
Bridge	£179
Sockets per 5	£29
Filestore E01S (stacking)	£999
Filestore 40Mb	£799
Cable (100 m)	£99
Printer server EPROM	£42

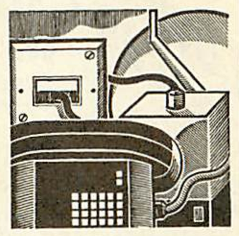
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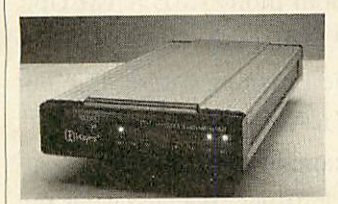
FASTER THROUGHPUT

When the BBC micro was first launched there were few modems on the market. The cheapest cost a couple of hundred pounds, and the baud rate was 300/300. The good old Beeb could easily cope with the incoming data.

Time has moved on, and modem technology has advanced a great deal. However, in the case of Acorn machines it seems that the hardware and software required to deal with the baud rates offered by today's high-speed modems is not good enough.

Let me explain. If legal OS calls are used the humble Beeb can easily cope with speeds up to 1200/1200 full duplex (both ways). Beyond that (2400 and 4800) and the Beeb starts to lose characters. One way around this is to ignore the OS and 'talk' to the serial chip directly – as did the *Zromm* from Modem Marketing. Not an ideal solution, but one that works.

For £1263.85 you can pick up an Archimedes 410/1 – state of the art technology. For around £1200 you can pick up a



Hayes V-series Ultra Smartmodem 9600 – also state of the art technology. The modem incorporates V.42bis error correction and data compression. The latter, under certain circumstances, gives an effective throughput of 38,400 baud. That's 3.75K going through the serial port of the Arc per second!

At £1200 very few people are going to spend money on a modem that costs more than their micro. But that situation is going to change within the next 18 months. PC compatibles are falling in price, and modem manufacturers have to do the same lest they price themselves out of the market.

Within the next year I predict that there will be around half a dozen 9600 baud modems incorporating V.42bis that cost between £500-£700. That's a very attractive price.

An Acorn bod I spoke to recently didn't think that the hardware of the serial port in the Arc could cope with 38.4Kbaud, never mind Risc OS (which would slow things down even further). I haven't done any specific tests (yet) to prove otherwise, but I will be disappointed if I find that the Arc cannot keep up with a V.32/V.42bis modem, especially since my £500 PC can.

Hardware manufacturers tend to underestimate the number of people who use modems, which is silly. It's hard to tell how many people actually use them on a regular basis, but a couple of factors will increase the numbers.

The first is the falling price of high-speed modems. Secondly there is connectivity: More and more people are using on-line databases for a variety of reasons.

Acorn should ensure that the serial driver in Risc OS is up to the job of dealing with high-speed throughput. And, if the serial hardware is not up to the job, then amend it to make sure it is. That way, Acorn can be sure that the hardware manufactured today meets the needs of tomorrow.



Don't ask me where I get the pictures for the gag item each month, they just happen to come my way! This time it's none other than Mel Croucher. 'Who?' I hear you cry. Well Mel is currently being heralded as 'a cult within the personal computer industry' by none other than Bruce Everiss, late of Imagine, Code Masters and Games Machine. Bruce is promoting the Mel Croucher Computer Fun Line. Updated each week, Mel spouts on about the computer industry and the people involved in it. Beware, though, this is a premium rate service.

HACKER CHARGED

Nicholas Whitely, a 21 year old self-confessed 'mad hacker' from Enfield has been convicted of causing £25,000 worth of damage to data held on university computers which are linked together via the Janet network.

Whitely has been accused of destroying valuable data over a six month period, and replacing it with childish and disturbed messages and threats.

David Janda

NEWS IN BRIEF

- My thanks to Ian Hambelton, sysop of Phase II. He informs me that I incorrectly printed details of his board in the feature on Shatternet boards in the May issue.

His board is both scrolling and viewdata and isn't part of the Shatternet network. He also points out that Channel-X network is no more. Phase II is on 081-330 7738.

- A point raised by Ian Hambelton relates to BB networks. He does not like the idea, and neither do I.

The majority of BBs are run on a voluntary basis, and as soon as someone starts to organise a network some of the fun goes out, and bureaucracy creeps in.

By and large this does not put off callers, but sysops themselves. Fewer sysops means fewer boards which results in fewer callers – and that's bad news for all.

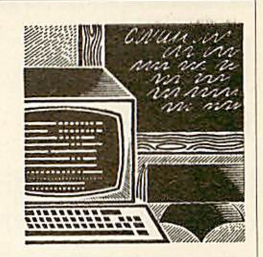
- The item in the April issue concerning the 0401 Plus point-to-point Lirpa-1 multiplexer resulted in a number of readers sending me email.

The idea of using such a device to monitor unregistered modem users is beyond belief, hence the Lirpa-1 unit, which is 1 April backwards! Thanks to the person who sent a long message detailing the reasons why such a device couldn't work!

- A note from Chris Royle, sysop of the Sin Bin, informs me that his BB software now supports full online editing facilities for all editors.

Chris has also released *Premiere*, the successor to *CARBBS*. It supports more data storage and has more facilities. Prices range from £24 to £34. The Sin Bin is on (0532) 661536.

If you have any comms news, please send it to David Janda at BBC Acorn User or contact him on Telecom Gold on 81:RED001 or on Prestel 919992492.



SOFTWARE FUNDING SCHEME

Dr Noel Thompson, chief executive of NCET, has announced which software developers are to share the £750,000 provided by the DES under the Educational Software Development Partnership scheme.

Over 120 bids were received from public and private sectors of the industry. Dr Thompson said, 'We were greatly encouraged by the large number of excellent software proposals which we received under this timely initiative. The educational software industry has responded with a high degree of originality and professionalism.'

He added, 'We were pleased to see that many of the developers recognised the importance of improving portability by programming in C, but we did not see much use of the new hypermedia environments which, for some applications, would not only reduce development time and costs but would also offer greater flexibility to users.'

Science, mathematics, technology, history, geography, modern languages, special needs and primary needs are all to be covered.

The accepted proposals address aspects of IT including communication, information handling, modelling and measurement and control.

Some areas were under-represented. These included English and language development and development of macros, files and support materials.

The recipients of funding are; The Advisory Unit, Autographics, Black Cat Software, Central Television, Plymouth Centre for Information Technology in Education, CWDE Software, ESM, Glentop Press, Leicester University School of Education, Logo 2000, Logotron, Resource, Widgit Software and King's College London.



The prizes in the sixth Times/Tandon International Newspaper Day competition were presented by Valerie Singleton at the Science Museum in May.

Pupils at Linlithgow Primary School, Linlithgow, West Lothian, were winners in the primary category for their paper Primary Press. The secondary category was taken by students at The King's School in Worcester who managed to produce two impressive editions of The King's Herald in one day.

Over 200 schools participated in the Newspaper Day, using stories sent via Campus 2000 to compile their papers. Judges commented that the standard of entries is rising each time the event is run.

MESU REPORT

More news of our favourite quango as HM Inspectorate has published a report on the work of the Microelectronics Support Unit (MESU, now, of course, part of NCET) for the period April 1986 to early 1989.

The report is complimentary about the efficiency of MESU's information service; the training it has provided for new advisory teachers; its development of IT support materials, particularly in the humanities and the field of microelectronics systems; and the way in which it publicised its activities.

However, the report criticised some aspects of the unit's work, including the time it took for services and projects to get started, especially in its first year when expectations were high.

It said that MESU 'frequently sought to do too much, with insufficient delegation to outside agencies. Materials it published for advisory teachers were almost invariably late.'

Other criticisms are that its development priorities were not always well considered and that until mid-1988 it had made only limited contact with providers of teacher education.

Noel Whalley of NCET was anxious not to appear defensive about the report. He said initial problems were due to a nine-month delay in recruiting staff.

On the question of late publication, he commented, 'There may be an element of justifiacation in this criticism, [but] educational publishing is littered with materials which have been inadequately piloted and tested... HMI has testified to the high quality of these materials which could not have been achieved in a shorter time.'

Mr Whalley conceded the point about teacher education but said, 'Nevertheless, NCET has now been able to develop substantially its support for initial teacher trainers.'

The report is available from the Department of Education and Science, Publications Despatch Centre, Honeypot Lane, Stanmore, Middlesex HA7 1AZ.

Lisa Hughes

NEWS IN BRIEF

● *Deadline Plus* is an advanced version of the schools' DTP program *Deadline* which comes with the resources to help you create a realistic newsroom.

Features include flexible four-column page layout, a number of fonts and headlines and the facility to load files from other packages.

Deadline Plus comes with an informative guide and can be used with the ITV Schools series *Deadline*.

It runs on the Master 128 with a double disc drive and costs £26.25. It is available from Mercury Educational Products, 8-10 Lower James St, London W1R 3PL.

● Computers in Education is a 40-minute video about – surprisingly – computers in education. It is presented by TV personality Fred Harris and Andrew Neil, editor of *The Sunday Times*.

Although mainly aimed at parents, the video could be of use to schools, perhaps to show at a parents' evening alongside pupils demonstrating their skills. It costs £19.95 and is available from Taylor Made Distribution Ltd, Harrington Dock, Liverpool XL70 1AX.

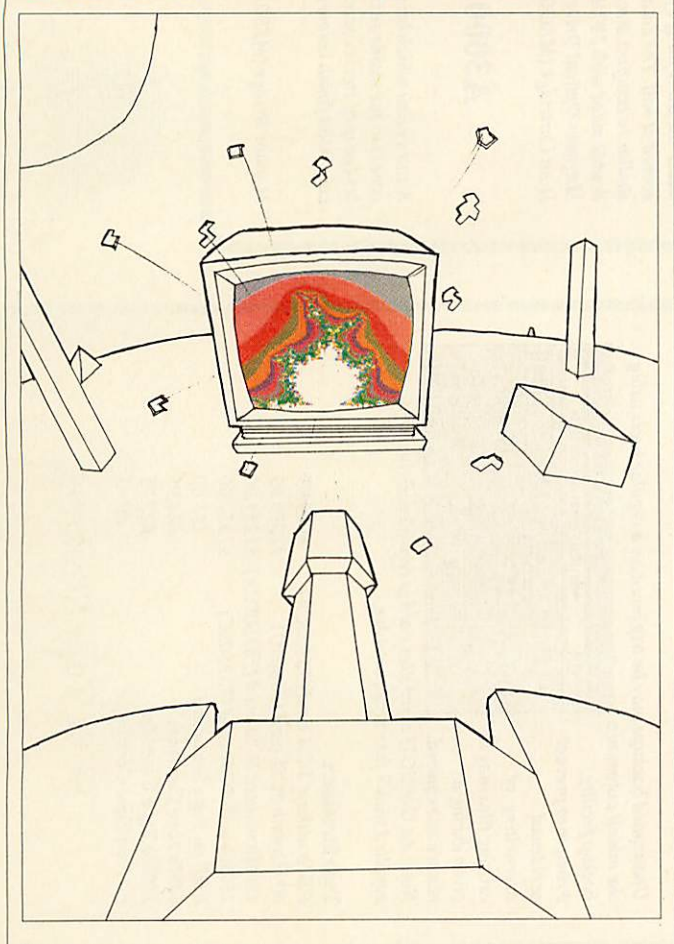
● Four years ago Roger Keeling and Senga Whiteman wrote the introductory spreadsheet program *Grasshopper*. This proved popular with both primary and secondary schools and, since then, the authors have frequently been asked for examples of how to use spreadsheets in the classroom.

The book, *Simply Spreadsheets*, is a response to those requests. It gives sensible but imaginative advice on how spreadsheets can be used.

It costs £6 with discounts for LEAs on orders of 20 or more, from KW Publications, 42 Compton Drive, Streetly, Sutton Coldfield, West Midlands B74 2DB.

Coming soon to BAU... NEXT MONTH

STAND BY TO ATTACK



We're battling with the August issue at this very minute.

You'll be able to play our exciting tank battle simulation on the Arc, learning about fast 3D wire-framing in the process.

There's also a new series on Arm2 machine-code programming, plus our continuing series on image processing.

The Mandlebrot set puts in an appearance with the fastest, most colourful plot we've ever seen running on the Beeb.

The education pages are also looking lively next month, with a look at the popular Pip and Roamer floor robots. Plus, there's a look at some of the 'pretty' amazing patterns that children create with *Craftshop*.

For all comms enthusiasts, the August issue is a must. We're calling on some of the country's many bulletin boards. Don't miss what we have to say.

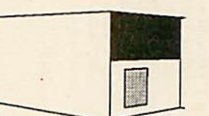
If you're thinking of ditching your old printer, perhaps you should think about buying an ink-jet model. There are now many to choose from and *BAU* has the low down on the best and the latest in laserjets too.

All this and more. *Wordwise Plus* users won't want to miss what we have to say about *Corplan* and should you kit out your brain with the *Knowledge Organiser*?

Plus all the regular features – latest news, letters, problems, Acorn hotline, yellow pages – that go to make *BBC Acorn User* the biggest and the best.

DON'T MISS THE AUGUST ISSUE – OUT 12TH JULY

16 bit SCSI



Oak's high speed 16 bit SCSI podule offers a new level of performance for the entire Archimedes range (including the A3000) with data transfer rates of up to 1.4Mb per second, a considerable increase over both ST506 and 8 bit SCSI controllers. Up to 2 Gigabytes of winchester storage may be fitted per machine, and seven SCSI devices including 4 winchesters may be attached to the card.

The card provides a new filing system 'SCSIFS', and an icon and filer for the Risc OS desktop. It can work in tandem with ADFS winchesters, and is compatible with the PC emulator. Low level (SWI) support is provided for other SCSI devices (e.g. tape streamers, CD ROMS etc.)



Internal winchester kits are supplied as 'plug in and go' units, with all necessary cabling and mounting hardware, and external drives are supplied in sturdy metal cases, colour matched to the Archimedes, and have their own power supply and fan. External drives are also suitable for the A3000.

A comprehensive manual with easy to follow fitting instructions is provided with each system, along with a versatile formatting and utility program. Oak SCSI drives may be write protected for security.

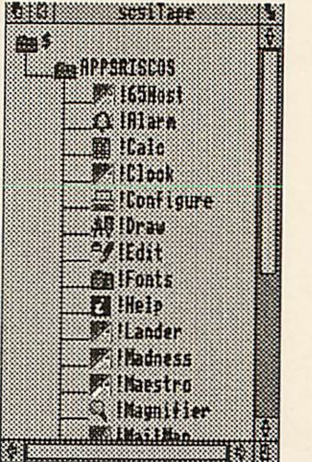


All Oak SCSI winchester drives are subjected to rigorous quality control procedures, and each drive comes with its own test certificate.

Internal Drives (inc. SCSI card)		**External Drives** (inc. SCSI card)	
20Mb (HDINARC20SC)	£375.00	20Mb (HDEXARC20SC)	£535.00
45Mb (HDINARC45SC)	£495.00	45Mb (HDEXARC45SC)	£655.00
80Mb (HDINARC80SC)	£795.00	80Mb (HDEXARC80SC)	£955.00
100Mb (HDINARC100SC)	£1114.00	100Mb (HDEXARC100SC)	£1274.00
200Mb (HDINARC200SC)	£1458.00	200Mb (HDEXARC200SC)	£1618.00
SCSI Card (SCSIARC)	£199.00	300Mb (HDEXARC300SC)	£2845.00
SCSI Card (SCSI3000)	£199.00	512Mb (HDEXARC512SC)	£4085.00
P&P internal drives/card	£10.00	P&P external drives	£15.00

16 bit SCSI Controller Card and High Speed Winchester Drives

Tape Backup



Oak SCSI tape streamers, available in 60Mb and 150Mb capacities are the ideal means of backing up large amounts of data. Using 'DC600' type data cartridges and high quality tape drive units, Oak tape streamers provide a reliable insurance against data loss. Multi-tasking, window software allows information to be backed up from any Archimedes filing system. Restoring data from tape is simple. A tree viewer of the directory structure stored on the tape, or a 'filer' type display can be shown in a window, and then the files to be restored can be simply 'dragged' with the mouse to the destination filing system, or even into an application!

Unattended backups may be triggered on a regular basis using the inbuilt automatic backup facility. Prompts to prevent accidental overwriting of existing files may be given during a restore as required.

Note: An Oak SCSI controller card is required. Drives are supplied with 1 free tape cartridge.

Tape Streamers	
60Mb without SCSI card (TS60SCA)	£999.95
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SCSI Tape Streamer

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A3000 Monitor Bridge

A sturdy unit which bridges the A3000 whilst still allowing access to the mains switch, disc drive and reset button. The bridge is of steel construction and is finished in a robust powder coat paint finish coloured to match the A3000.

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UNCLEAR MANUALS

I have recently purchased an Archimedes 310. Unfortunately I find that some of the Risc OS manual is unclear, particularly the part on using the many variations of the *SET command.

All these commands appear very powerful but little information is given on using them.

I would also like to know how to set up my own applications directories so that I can place all of my Master programs in them and access them from the desktop.

Finally I have read somewhere of a font editor which was supplied with the early machines, where can I get hold of one so that I may design a few special characters?

C P Bignell
West Sussex

The *SET commands are used to set system variables. They are like variables in a program but are available from within the operating system. Many of them have special meanings, for instance the time$ variable holds the current date and time.

These commands are explained in more detail in the Risc OS programmer's reference manual.

The March '90 issue of *BBC Acorn User* had an article on setting up your own Risc OS applications directory. The *Acorn DTP* package uses the outline fonts, and an editor for these is available on Acorn's SID database.

PRETTY PICTURES

I feel some comment has to be made on the slow progress Acorn is making on developing the Archimedes. The machine is now over two and a half years old, with no major hardware changes (except the introduction of the A3000).

What the machine needs to keep it ahead of the competition is expansion. I expect the next big software push will be in the area of video graphics. The Macintosh has been in this market for approximately a year with its 24 bit colour card (16 million+ colours). At the moment, it is the only personal computer offering this as an official upgrade. It cannot and should not be allowed to get further ahead.


The new Hawk V9 digitizer

Acorn has made a start with the Risc OS palette driver offering 24-bit resolution, but this was released nearly a year ago. Why has no hardware podule (or replacement VIDC chip) been produced or announced to utilise the machine's potential, or is this going to be left to the independent producers? Is it going to be a case of too little too late, like what happened with the PC podule?

S Ware
Cheshire

We'll have to wait and see...

MUSIC MAESTRO

Earlier this year I purchased an A3000. I have dabbled with graphics and bought a few games but the application that interests me most is *Maestro*. However, the rose-coloured glasses I originally viewed it through are beginning to fade.

My version frequently corrupts the music after scrolling, which can be most frustrating. Also, more importantly, I would like more flexibility to place the eight channels where I like on the staves.

I would also like to change voices, introduce slurs, crescendos and so on, during a piece. Where do I start?

E R Davis
Havant

***Maestro* is supplied with the A3000 as a 'freebie' and although it can be useful it is really only a taster of what the A3000 can achieve in the music area. EMR is selling several packages that enable the user to play and edit music on the computer, see the adverts in last month's *BAU*.**

If you have other musical equipment, you may want to buy a MIDI sequencing package which, as long as this equipment has a MIDI interface, will allow you to control these instruments from your BBC A3000.

Also from Clares comes the *Armadeus* package which includes a sound sampler and the software which allows you to literally record sound and play it back through the speakers connected to your computer. For more information on music refer to the October 1989 issue of *BBC Acorn User*.

A MULTIPLE VIEW

In answer to the query about multiple copies using *View*, (Questions and Answers, May '90) the simplest soloution is to multiple print the file, having first saved it to disc. Thus, in the command screen you type:-

```
PRINT <filename>
<filename> etc.
```

(type the filename after the print command as many times as you need copies.)

The operation can be speeded up by using a single letter for the filename. For example, if the file was called X then :

```
PRINT X X X X [RETURN]
```

would print the file four times.

Philip Foster
Cambridge

...NOT HERE!

I read with interest the letter in the March '90 *BBC Acorn User* from A Walrus of Basingstoke regarding Public Domain software for the Archimedes and I must agree with him regarding the cost of advertising PD. To be able to afford to advertise you must charge a reasonable amount for your software and if you charge a reasonable amount, it cannot truly be called Public Domain. Catch 22.

I run a PD/Shareware library for the Archimedes and have come across the same problem. I cannot afford to advertise, and so do not attract a large number of orders. I could solve that by charging more for the software, but that wouldn't be in the true spirit of Public Domain. The only way I can attract new orders is by word of mouth.

One point I must disagree with is the suggestion that magazines such as *BBC Acorn User* act as PD distributors. The reason for this is that large companies have large overheads and no matter how much they try to keep within the spirit of PD, they will charge 'over the odds' for software. The best way to encourage PD software is to offer reasonable advertisement rates for those that can be seen to be offering a true PD service.

Peter Sykes
Cleveland

OBSOLETE EQUIPMENT?

I have had an Acorn Electron for some years now and would like to redress the popularity balance by sticking up for this excellent machine even in these days of Risc architecture and 32-bit wizardry. My machine has served me well, only once breaking down, and then only with a minor problem.

I would suggest that many Archimedes owners never use them to their full potential, and have more money than sense.

Most reasonable computer applications including games are available for the Elk and I have never felt the need to purchase one of these new and frankly fangled machines.

I will continue to use my Electron until it breaks down completely, or I pass on – whichever comes first.

Peter J Honcap
Beardsliton

Well said, sir...


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QUESTIONS AND ANSWERS

Q I'm looking for a database program for my A3000 micro. Most seem to be either originally written for IBM PCs and re-jigged for the Archimedes series or written for the old Arthur OS or amazingly expensive! Have I missed some packages?

A I'm afraid you are more right than wrong. *Flying Start* from Mitre was cloned from the IBM PC. *AlphaBase* from Clares was written for the previous Archimedes Operating System. Minerva's *System Delta-Plus II* is not multi-tasking although it can run on Risc OS. Minerva's latest *Multi-Store* is brilliant but costs £299.

You could wait for *Data Vision* from Silicon Vision which will be £199 but this will not be multi-tasking.

Q I have been rather disappointed with the BBC micro emulation provided by my BBC A3000. Is there a better emulator other than *!65Host*?

A A new version of *!65Host* has been released which is a substantial improvement on the original. It's faster and full BBC sound emulation, printing and DFS directory structure emulation is provided.

Q I have an Archimedes computer running *ArcComm* and the Amstrad SM2400 modem. Unfortunately I have been unable to get this system to work properly. Have I wired up the cables correctly?

A *ArcComm* will work with most common modems but you will need to wire up your modem differently to the standard recommended by Acorn – the IBM PC standard.

The diagram for *ArcComm* was given in the March 1989 issue of *BBC Acorn User* on page 135. The diagram might seem to be reversed as the view is from the rear of the plug (male) but the Arc end of the cable is a socket (female). The pin numbering should be swapped left for right when wiring up a socket.

Q I'm a Master 512 owner and I've heard there is a memory monitor built into the 512 Rom. My problem is I don't know how to access it!

A You should start up your 512 as normal and press BREAK. When Dos-Plus has loaded, the screen will clear and report the standard second processor message and the filing system and give you a star prompt.

If you now type *HELP MON. a list of commands will appear. These are documented in *The Advanced Reference Manual for the BBC Master* published by Watford Electronics.

Q We have purchased a couple of BBC A3000s and would like to know how to use these computers in our older model B based network at school.

A Before an Archimedes or an A3000 can be linked to an Econet you will have to add an Econet circuit board. This is the same board as fitted into a BBC Master 128.

The utilities to enable the Arc to work on a network are already included in the modules provided within Risc OS.

The station number of an Archimedes is set by using a program called *SetStation* included in the ArthurLib directory on the hard disc of your *Filestore*. If your Econet predates the release of the *Filestore* software, you will have to contact Acorn for an update.

Q On my PC at work the f3 key repeats the last Dos command typed, the f1 key repeats individual characters and f6 repeats the end of file character. These useful features don't seem to be available on the Master 512. Instead various keywords appear when the function keys are pressed. Is there any way I can make my Master 512 at home behave like the one in the office?

A The function key facilities you want are not available when your Master 512 system boots but the standard IBM definitions are available if you load the second copy of the COMMAND.COM file. Just type COMMAND.COM at the Dos prompt with Disc 1 in the drive.

Q I have decided to transfer all my DFS text files to ADFS so that I can hold more files per disc. At present I have been doing this by loading and saving each file individually. It is very slow! There must be a better method, what is it?

A What you are doing is certainly not the best method! There is a program called *CopyFiles* on the Welcome disc. This will speed things up a bit but it will still be rather time consuming. Instead, invest in a copy of

If you have a problem with an Acorn micro, commercial software or a program you are trying to write then BBC Acorn User can help. The Post A Problem service guarentees to give you a personal answer within 10 working days for just £4.

Write out you problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon at the bottom of this page and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you want recorded delivery add on the cost of this.

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Macopy available from Care Electronics or Morley Electronics (both of these advertise in *BBC Acorn User*). This package comes on Rom or disc and uses all the Master's memory (including the 64K sideways Ram area) to effect the transfer of files between DFS and ADFS in either direction. It is automatic and fast!

Q I have been experiencing difficulty getting the *Money Management* program originally published by Gemini to run on my Archimedes. I've tried getting it to run under the *!65Host* emulator but without any luck. Can you offer any suggestions as to suitable but simple software to cover this kind of application on the Archimedes?

A You could try a simple package called *Traccs* from Galesoft, 30 Barne Close, Nuneaton, Warwickshire. However, a far better program is Minerva's *Home Accounts* package which exploits the power of the Arc to the fullest. It's multi-tasking and is tremendous for graphing your income and expenditure on all headings.

Q I want to upgrade my Master Compact to PC compatibility. A friend has done this with his Master 128 and he is very pleased. How do I do this with a Compact?

A I am afraid you cannot upgrade your Compact to PC compatibility. The necessary hardware is not present in your machine to allow the 80186 co-processor to be fitted.

Q I have a normal BBC model B and I have been having problems using the *Spellmaster* Rom from Computer Concepts with some of the products from Solidisk.

A In a normal BBC model B *Spellmaster* has to claim workspace on machines fitted with *Wordwise Plus* or *View*. In these cases it is preferable for it to be fitted into a lower priority socket. Similarly for it to work correctly in some Rom or Rom/Ram boards, Roms must be given a higher priority socket than *Spellmaster*. This is certainly the case in a Watford shadow Ram board.

Computer Concepts has advised *Spellmaster* users that there are some difficulties with versions of Solidisk DFS and ADFS which prevent *Spellmaster* from working unless it is in a lower priority socket.

I suggest you contact Computer Concepts to see if it has upgraded *Spellmaster* to cope with the Solidisk problems.

Q I have a BBC model B with a sideways Rom board and want to use it to run programs which have appeared in *BBC Acorn User* where the need for shadow Ram is specified. What can I do?

A Watford Electronics sells its own shadow Ram board and the 'original' Aries shadow Ram board. Either of these would suit your purpose. But whether they would fit into your micro alongside your existing sideways Rom board is the problem.

Some shadow Ram boards have been particularly designed to match up with particular sideways Ram boards. You'll have to check this before you buy. Watford and Aries both market their own pair of boards for both shadow and sideways Ram.

Q I've just picked up a second hand BBC model B with a disc filing system fitted. I thought it would also work with a tape recorder for loading and saving programs but it does not seem to function with a tape recorder.

A If you have a disc interface fitted into a BBC model B the machine will always default to the Disc Filing System. You can only access the Tape Filing System by typing in *TAPE (or by holding down T while pressing BREAK). It is also best to alter the value of PAGE by typing in PAGE=&E00.

The Tape Filing System should now work correctly and you can load and save programs to and from your tape recorder.

ACORN CUSTOMER HOTLINE

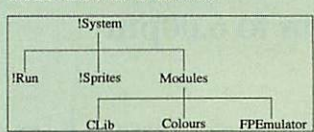
- Acorn Archimedes and BBC A3000 computers come with a *!System* application on the Apps1 disc, or hard disc. Within !*System* are a number of modules shared by applications such as *!Paint*, *!Edit* and *!Draw*.

These extend the operating system. Once loaded they may be accessed by any application.

The modules which Acorn supplies are *CLib* (the shared C library), *FPEmulator* (floating point emulator) and *Colours* (colour translation module).

The *!System* application has been upgraded numerous times. Acorn has allowed third parties to incorporate *!Systems* with its software packages and has also released a new *!System* application on the Risc OS extras disc (see *BBC Acorn User* January 1990 for details on obtaining the Risc OS extras disc).

The *!System* application is structured as follows:



All these *!System* directories can get confusing. However, the modules are compatible with earlier versions so you need simply ensure you use the latest one by checking the date stamp.

Enter the *!System* application by holding down SHIFT and double clicking on the *!System* application. Enter the Modules directory by double clicking.

Then click the middle mouse button over the window containing the *CLib*, *Colours* and *FPEmulator* modules and by moving across the menu to the right of the word Display, another menu will appear. The top three options will be Large icons, Small icons and Full info. Clicking on Full info displays information on files in that window, including the date when the files were created.

Check these against the dates in other *!System* application directories to find the latest version of the *!System* and then ensure that all copies on all discs are the same. This avoids confusion if newer versions are released. Be careful not to delete any third parties' modules.

- When using the *!65Host* application from the Risc OS extras disc you can create mini-applications that boot themselves at the same time as starting *!65Host*. This is useful for educational users who are booting BBC software into *!65Host* from networks. For an application note on how to do this, send an A4 SAE to the Acorn Customer Services Dept.
- A number of enquiries ask about the new version of the PC Emulator and DR-Dos.

DR-Dos, developed by Digital Research, is an alternative operating system to MS-Dos, claimed to be fully compatible with MS-Dos 3.3 applications.

The OS has a built-in Help system, which will be of value with Acorn's Learning Curve.

The PC Emulator version 1.33 has undergone a minor upgrade to 1.34 to allow operation with DR-Dos (as supplied with the Learning Curve package). Both versions of the PC Emulator continue to be compatible with MS-Dos version 3.

Speed and applications compatibility are similar with either operating system or PC Emulator. There is a loss in workspace of around 25K with DR-Dos due to the Help feature.

- The PC Emulator has now been approved by the Open University, allowing students to use the Archimedes or BBC A3000 for its 1990 computing courses.

Details of courses are available from the Open University.

Peter Dunn

Peter Dunn and the Acorn Customer Services Department can be contacted at Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN.



For all Archimedes and A3000 owners, **DAVE ACTON** has compiled

RISC REVUE

Graphic detail of the effects of wave interference

£40 RIPPLE TANK

We open with a rather nice demo from Simon Levitt of Cambridge. It's a sort of electronic ripple-tank, showing in graphic detail the effects of wave interference.

The program is listing 1 on the yellow pages. Run it and enter the number of wave sources. This is only limited by the memory available in your machine but you might just like to try it with two to start off with. Then specify the size of tank'. This may be 64, 128 or 256 pixels along each side. Obviously the larger the picture, the slower the animation since there will be many more calculations to make. Try 64 first time.

Now you must describe each of the wave sources. Press 'S' and then use the up and down arrow keys to select a wave source. The square in the middle indicates what will be the animated part of the interference pattern.

You can place a wave source in this box or outside it. Just move the pointer to the desired position and press either the left or right mouse button.

A cross indicates each wave source and the co-ordinates are shown in the top right-hand corner of the screen for more accurate positioning.

The amplitude of the selected wave is set by pressing 'A' and then using the up and down arrow keys. Similarly, the frequency may be altered.

As a first experiment try positioning two wave sources in opposite sides of the square with amplitudes of 200 and frequencies of 6. When ready, press the middle mouse button to start the simulation. Hold down SPACE to return to the set-up screen.

So that you can place sources quite a way from the displayed area, a 'zoom' option is provided on the set-up screen.

Press Z and then use the arrow keys to alter the zoom factor. A factor of 8 will allow the most distant sources to be included and this is particularly useful when you are using a large displayed area of 256 by 256 pixels.

Finally, ESCAPE will re-start the program and SHIFT ESCAPE will exit from it. Incidentally, note that at least 160K of screen memory will be needed since two mode 13 screen banks are used. Use *CONFIGURE ScreenSize appropriately before using the program.

Each wave source is given its own part of a main array (called space in the program). Each is examined in turn and the array is filled with numbers representing distances from the source in the range 0-179.

Each time the waves are animated, these distances are decremented. On reaching -1 they are reset to 179. In this way, motion away from the centre of the wave is achieved.

The main table of distances is built up by a Basic routine that draws concentric filled circles around the wave source. The colour of each circle represents the distance from the source. In this way, each point in the visible area can be examined quickly to find its distance from the centre of the waves.

The examination is performed by the machine-code routine .setarray. Incidentally, this process takes place on the hidden screen bank – REM out line 1670 if you want to see what's happening.

When animating, each point in the visible area is examined. Looking at the first wave source, the value in the main array is looked up and this is used to find a value for the height of the wave at that point.

This process is repeated for the remaining wave sources: the heights are added up and 'averaged' so that the result is in the range 1 to 16.

Finally, this value is converted into a shade of grey and poked directly onto the screen. Two screen banks are used for smooth animation.

The structure of the program should be fairly self-evident. PROCsetupsources builds the main array. PROCchecklimits is called so that the minimum amount of circle plotting takes place. PROCanimate (as you might expect) animates the wave patterns, calling PROCswap to switch screen banks.

The machine-code routine .display[takes as its parameters the number of wave sources in R0 and the size of the viewing square (64, 128 or 256) in R1.

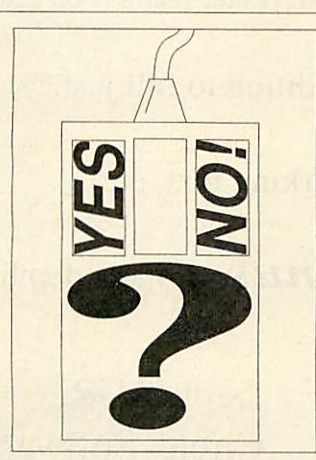
PROCarmcode assembles the machine-code used. .setup reads the address of the start of screen with 'OS_ReadVduVariables' for future use by .setarray and .display. The program runs in the 256-colour mode 13 and the first DATA statement at the end contains 16 'pokable' values forming a scale from black up to white.

A final modification you might like to try is to alter the value at line 2980; this is the wave speed. Simon recommends that you don't make this too large or the effects become rather 'jumpy'.

YES AND NO

You will notice that Risc OS sometimes changes the pointer shape when asking you to confirm an action (for example if you delete a directory). This facility is available to any user and comes in the shape of a SYS call 'OS_Confirm'. Listing 2 illustrates this.

The call takes no parameters and waits for the user to indicate yes or no by pressing a key or a mouse button. It returns with the key pressed in R0, the C flag set if ESCAPE was pressed



and the Z flag set if the answer was yes. Note that these flags are read into the variable flags% by use of the semicolon in the SYS statement.

The left mouse button and the 'Y' mean yes; all other buttons and keys mean no.

BACK TO BASICS

And so to our spot for those new to Basic V. One of the many advantages Basic V has over previous versions is its improved string-handling facilities. The familiar functions LEFT$(, RIGHT$(and MID$(can all be used as commands in order to overwrite parts of an existing string. For example, try:

```
t$="ABCDEF"
ID$(t$,3,2)="xx"
PRINT t$
```

Similarly, try:

```
LEFT$(t$,2)="yy"
```

or:

```
RIGHT$(t$,2)="zz"
```

If the new string portion is shorter than the part it is replacing, the excess characters will be left intact. If the new portion is longer, extra characters are ignored.

When writing a string to a file with PRINT#handle%,t$ for example, it is stored specifically as a string variable and the characters appear in the file in reverse order.

Often though, it is more useful to write a string of bytes to a file in the correct order – a multiple BPUT in fact. Before Basic V, the only way of writing a 'raw' string of characters to a file was with your own routine, viz:

```
DEF PROCws(t$,handle%)
FOR i%=1 TO LEN(t$)
BPUT#handle%,ASC(MID$(t$,i%))
NEXT
ENDPROC
```

Now, the BPUT command has been extended so the above routine can be replaced with:

```
BPUT#handle%,t$
```

A new line (&0A) is written after the string unless you follow the BPUT statement with a semicolon. Strings can be read in from a file with:

```
t$=GET$#handle%
```

There are also many new array-handling features in Basic V. We'll be looking at these in a month or two, but the one that applies to strings is the command SUMLEN.

This returns the total length of all the elements of a string array. For example:

```
DIM test$(1)
test$(0)="Hello"
test$(1)="Jim"
PRINT SUMLEN(test$())
```

will produce the correct value 8. Note that there must be no space between SUM and LEN.

Note also that whenever referring to arrays in general you must include empty brackets – test$() in this case.

CHECK YOUR SUMS

Winner of the 'little known SWI of the month' award goes to 'OS_CRC' – a handy little call for providing checksums for blocks of data.

Listing 3 on the yellow pages illustrates its use. A filename is requested and then a checksum is produced. The call takes the form:

```
SYS'OS_CRC,check,start,
end,step TO check
```

The variable check is the ongoing checksum and should be set to zero at the start. Like listing 3, you don't need to checksum the data with a single call – the current value is returned in R0 and can be used for subsequent calls. The variables start and end determine which area of memory is to be checked and the step will usually be 1.

A step of 2 means every other byte will be looked at and if you are using a step other than 1 (even a negative one is allowed) you must ensure that the end address is a multiple of the step from the start. If not, the call will never return.

Listing 3 checks the given file in chunks of size chunk%, reading each section of the file with OS_GBPB.

Having such a call to hand is particularly useful when writing software that uses 'dodgy' lines of communication, such as the sending of data down a telephone line. It is also a handy tool when writing your own filing system.

£10 SMALL CHANGE

Here's a really short and neat way of converting BBC and Master screens to the Arc. It comes from Gordon (T Gopher) Jefferyes of Harrow who gets a tenner for his troubles.

Gordon's idea uses the inbuilt pattern generators of the Arc, defined with a VDU 23 sequence. (By default, these are dealt with as they were on BBC and Master machines.) Using these patterns means that Risc OS does all the hard work, so the segment of code needed is simply this:

```
10 MODE 0/1/2
20 OFF
30 N%+OPENIN"FILENAME"
40 GCOL 16,0
50 FORY%+992 To 0 STEP-32
60 FOR X%+0 TO 1279
   STEP 16
70 VDU 23,2, BGET#N%,
   BGET#N%,BGET#N%,
   BGET#N%,BGET#N%,
   BGET#N%,BGET#N%
80 RECTANGLE
   FILLX%,Y%,15,31
90 NEXT X%,Y%
100CLOSE#N%
```

You will need to have saved your BBC screens in the usual way, with:

```
*SAVEFilename 3000 +5000
```

for example. Change the first line of the program above to set the correct mode and alter the filename appropriately. As you can see, there are two nested loops. Bytes are read in from the file eight at a time – you will remember that BBC screens are organised in character blocks of eight bytes. The sequence VDU23,2 defines fill pattern one and then a simple RECTANGLEFILL is used to put the bytes in the right place on the screen.

The program could easily be altered to load mode 4 or mode 5 screens. Apart from selecting the correct mode number at the start, alter the step in the X% loop to 32 and change the last parameters of the RECTANGLEFILL to 31,31.

Incidentally, because the Archimedes deals with colours in a different way to the BBC at the level of putting bytes on the screen, there is a further VDU 23 to select BBC or Risc OS patterns. VDU 23,17,4,n,0,0,0, 0,0,0 is the call where n=0 for BBC and n=1 for Risc OS patterns. For those who are interested, table 1 summarises the bit order of bytes of screen memory on the BBC and with Risc OS.

For example, mode 1 is a four-colour mode and each byte represents four pixels. On a BBC the colour of the leftmost pixel is determined by bits 7 and 3 whereas on the Arc bits 1 and 0 are (more logically) used.

TRY YOUR HAND...

Send your programs, ideas, hints and tips to: Risc Revue, BBC Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. You too can be a* BAU *star so come on, show us what you're made of!*

Mode	BBC/Master colours	Risc OS colours
0	7,6,5,4,3,2,1,0	0,1,2,3,4,5,6,7
1	73,62,51,40	10,32,54,76
2	7531,6420	3210,7654

Table 1. Bit order of bytes of screen memory

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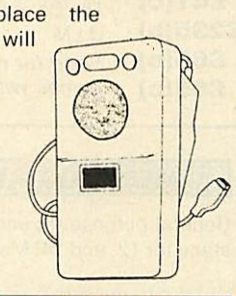
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The scanning area is 4" wide and vertical height is limited only by memory constraints. The image brightness is adjustable to obtain the optimum quality. Tone selector allows different settings for text and photos.
Software appears as an icon on the icon bar from where all its facilities can be accessed. Software features include:
Visual rescaling of either X or Y axis, X & Y flips, colour tinting, picture cropping, on screen help, etc. RISC OS's anti aliaising feature is utilised to enhance the image quality.
Scanned images can be saved as sprite file or dragged into other applications. The images can be output to compatible printer as a sprite using one of the RISC OS versatile printer drivers.
The manual is written in easy to follow style with hints and tips for getting the best results. The manual together with interactive on-screen help gets you going almost immediately you have installed the scanner.

***techno*SCAN complete with interface card and manual**	**£149(b)**
***techno*SCAN for A3000**	**£189(b)**

A3000 4MB RAM CAPABILITY

The TechnoRAM Card for the A3000 with either 1MB or 3MB on board, allows you to expand up to 2 or 4MB. 1MB version upgradeable by us to 3MB. Totally compatible with Econet upgrades.

1MB technoRAM £89(c) **3MB technoRAM £249(c)**

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Std Res, 14" **£169(a)**
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Std Res + PAL/Aud, 14" **£199(a)**
Microvitec 1455
Med Res, 14" Arc/BBC **£219(a)**
Microvitec 1441
Hi Res, 14" **£359(a)**
Dust Cover for Microvitec 14" monitors **£5.50(d)**
Philips CM 8833 14" RGB
Med Res, 14", TTL/Linear Mono/Colour, Stereo sound. **£239(a)**
Acorn Philips
14" Colour Monitor **£220(a)**

TAXAN SUPER VISION 625 (B/B+/M)
12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£269(a)**
TAXAN 775
MultiSysnc Autoscan 14", ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand **£419(a)**
TAXAN 870
Multisync autoscan 16" **£629(a)**
VIKING II
19" Hi Res white screen monitor for CAD applications comes with Tilt & Swivel stand. **£849(a)**

technoSCSI PACKS

New, from Technomatic, combination SCSI drives and the ACORN SCSI controller card.

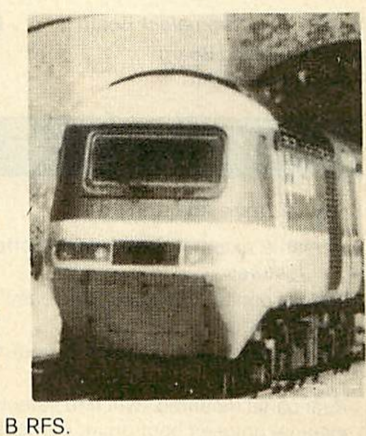
105 Mb Internal	**£899(a)**	105Mb External	**£999(a)**
330 Mb External	**£1999(a)**	680 Mb External	**£2999(a)**

MULTIPOD PROFESSIONAL

Professional design and use of latest hardware/software technology have enabled this five function podule to provide the highest quality performance at economical and realistic price. The five functions are:

FAST-SCAN VIDEO DIGITISER: Offers the highest resolution and number of picture levels of any video digitiser for the Archimedes computers. Capable of digitising in any mode to 640 × 512 pixels with 256 grey levels. Colour can be digitised with a camera and filters providing 24 bit colour resolution. Software operates within Desktop and offers contrast/brightness control, zooming, grey scaling and sprite saving.

SOUND DIGITISER: Samples for sound frequencies from 4KHz to 80KHz can be manipulated, composed and saved. Editing functions include filtering, mixing, overlaying, swapping, cut/paste. Saved sound modules including stereo sound samples can be used in various applications including games or can be exported to other sound packages. Operates within desktop environment.



SERIAL PORT: A full RS232 implementation of a dual channel comms port. It is IBM compatible using a 25way D connector. Uses *FX and SYS calls.

INSTRUMENTATION/JOYSTICK PORT: A high speed A to D convertor which provides samples at up to 100 KHZ for versatile datalogging. As BBC B analogue port, uses the usual ADVAL commands.

ROM SOCKETS: 3 ROM sockets for use through built in BBC B RFS.

MULTIPOD PROFESSIONAL	**£117(b)**
FILTER SET FOR VIDEO CAMERA (RGB)	**£15(d)**

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PRINTERS & PLOTTERS

EPSON

Epson LX/FX
Epson's budget priced 9 pin printers offer quality and reliability with Epson's advanced paper handling technology, draft and NLQ print in variety of typestyles and fonts:

LX400 180cps draft 30cps NLQ	£135(a)
LX850 200cps superdraft 30cps NLQ	£209(a)
FX850 264cps draft 54cps NLQ	£319(a)
FX1050 as FX850 but wide carriage (132 col)	£409(a)

Epson LQ range
Epson's 24 pin printers with superior draft and letter quality, variety of typestyles and fonts, high res graphics, advanced paper handling and Epson's reliability:

LQ400 180cps draft 60cps LQ	£209(a)
LQ550 180cps draft 60cps LQ	£279(a)
LQ850 264cps draft 88cps LQ	£465(a)
LQ1050 as LQ850 but wide carriage (132 col)	£575(a)

Epson Colour Printers
High speed 9 and 24 pin printers with colour option fitted:

EX800 300cps draft 60cps NLQ	£429(a)
EX1000 as EX800 but wide carriage (132 col)	£549(a)
LQ860 as LQ850 but with colour	£529(a)
LQ1060 Wide carriage version of LQ860	£649(a)
LQ2550 400cps draft 133cps LQ	£880(a)

Epson Inkjet/Laser Printers

SQ850 600cps draft 198cps LQ	£569(a)
SQ2550 as SQ850 but wide carriage (132 col)	£899(a)
GQ5000* Laser 6ppm multifont	£895(a)*

(Free 12 months on site maintenance included in the price)

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NATIONAL PANASONIC

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KXP1124 24 pin 190cps draft 63cps LQ	£209(a)
KXP1540 24 pin 240cps draft 80cps LQ 132 col	£429(a)

STAR

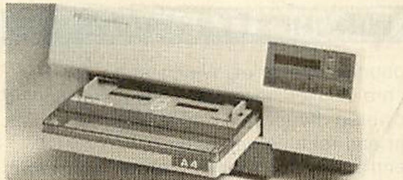
LC10 9 pin 144cps draft 86 cps NLQ	£139(a)
LC15 as LC10 but wide carriage (132 col)	£289(a)
LC10 Colour version of LC10	£179(a)
LC24-10 24 pin 180cps draft 60cps NLQ	£209(a)
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INTEGREX

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Laserjet Series III	£1249(a)*



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Deskjet £449(a)* Paintjet	£719(a)*

*FREE 12 months on site maintenance contract included

PLOTTERS

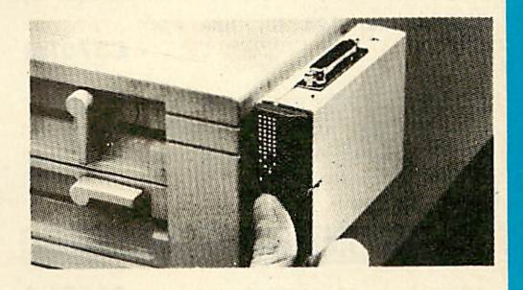
ROLAND A3 8 pen FLATBED PLOTTERS

DXY1100	£630(a)	DXY1300	£1085(a)
DXY1200	£915(a)		

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Smart Printer Buffer 256K
256K parallel buffer with facilities for 256 copies, PAUSE, RESET & SELF-TEST **£149(b)**

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An economical solution for connecting two computers to one Printer or one computer to two printers. Easily attaches to the side of computer or monitor (specify parallel or serial) **£19(c)**



Manual Printer Sharers:
(All lines are switched).

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2 computers to one printer	£23(c)	£23(c)
3 computers to one printer	£30(c)	£30(c)
4 computers to one printer	£36(c)	£36(c)
2 computers to 1 or 2 printers	£49(c)	£49(c)

Cable sets for above sharers available for all popular computers

BBC Computer Sharer: TCS26
1 computer to 2 printers fitted with BBC cable **£15(c)**

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BBC/Master (1.2m)	£5(d)	BBC/Master (2m)	£7(d)
Archimedes (2m)	£7(d)	Compact (1.2m)	£7(d)
		Nimbus 2m	£7(d)
36/36way centronics (2m)	£9(d)		
IBM/PC Compatible (2m)	£7(d)		

CONSUMABLES

Serial Interfaces

Epson 8143	£32(d)
Nat Pan KXP17	£39(d)
Epson8148(8Kbuffer)	£79(d)
Taxan	£49(d)

Buffers

32K Buffer IC for P1124/1540	£18(d)

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FX800/850, LQ800/850	£135(a)
LC10 £55(b) LC24-10	£89(b)
Brother HR20	£209(a)
KXP1124 £88(b) KXP1540	£179(a)

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Star:

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LC10 Colour	£6.50(d)
LC24-10	£5.00(d)

National Panasonic

KXP1081 £3.50(d) KP1124	£6(d)
Taxan KP810/815/910/915	£5.00(d)
Juki 6100	£1.80(d)
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Integrex Colour Cartridge	£16(d)

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Epson HI80 4 pen set (water/oil)	£7.50(d)
Hitachi 672 6 pen set: water	£18.50(d)
Oil	£25(d)
Roland 4 pen set. (water/oil) (various sizes)	£7.50(d)
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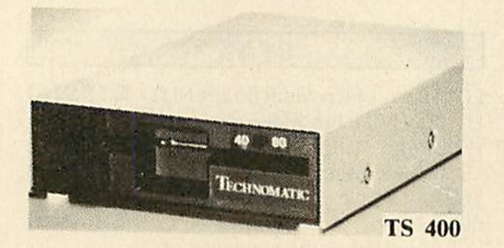
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A range of high quality high performance drives to meet the needs of all BBC Micro Users.
*All drives are fited with high quality slim line ultra lower power mechanisms capable of single and double density operation and offering fast track access and head setting times.
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*Our plinth drives have been thoughtfully designed and provide a choice of two 5.25" drives or a combination of 5.25" and 3.5" drives.



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PD 800P

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PS400/PS351 are Compact/Archimedes compatible.
PD800/PD352/PD853 are Archimedes compatible.

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PD352 3.5" dual drive with integral mains power supply in a 5.25" case.	**£139(a)**

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41464	**£8(d)**

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Acorn 1772 DFS Kit	**£49(d)**
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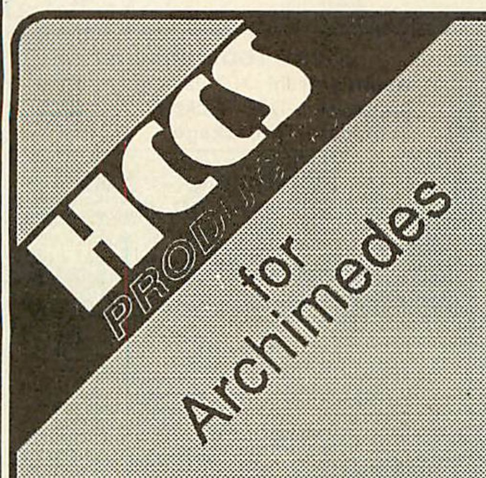
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** Requires System Delta*

(P&P on above items £2)

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.

New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

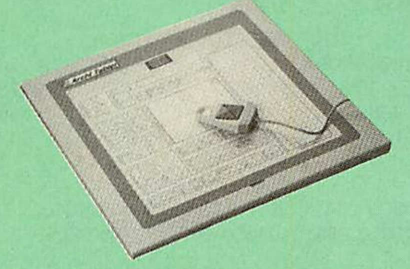
With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Archimedes Micros, Philips, Microvitec, and Multiscan COLOUR Monitors. Also on the full range of Panasonic Printers.
Should your machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours to repair the unit. (P.S. This offer is over and above our Unbeatable Winter Sale Offers on Archimedes Micros). (Offer applicable only when bought at prices advertised in this advert).

Archi Graphic Tablet



This package allows Archimedes users to take advantage of the low cost graphpad (sometimes called a digitiser tablet, but not to be confused with a video digitiser!)

The Archi Graphpad offers performance and accuracy comparable to other graphics tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely.

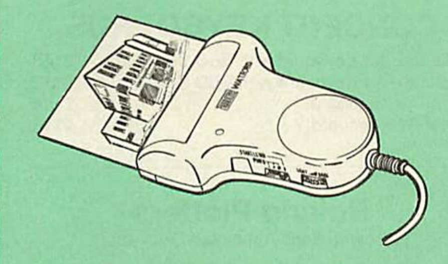
The software, which is in the form of a relocatable module (RM), intercepts the system calls which control the mouse, and so allows virtually all mouse based Archimedes software to be controlled using the tablet without any modification. The only exceptions are programs which use the serial port, as the tablet is physically connected to this port itself.

The software is supplied with a special adaptor lead to connect the tablet to the Archimedes' serial port, and a power lead which plugs onto the Archimedes' main board.

(For further details, please telephone or write in for our FREE catalogue.)

Special Price £249 (carr. £4)
(Price includes Tablet, Leads & Software)
Stylus Optional Extra **£29**

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this sytem. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available.

On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

AHS-4	**Archi 300/400 Version**	**£149**
AHS-3	**Archi A3000 Version**	**£175**



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Z88 Portable Micro



Only: **£195** (Carr £4)

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With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

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AA Nicad Rechargeable Battery	£1.50
Battery Charger Compact & Fast	£6
Z88 Serial Printer Cable	£9
Z88 Parallel Printer Cable	£25
Z88 to BBC Link	£20
Z88 to PC Link II	£30
Z88 to Macintosh	£52
Z88 Mains Adaptor	£9
Z BASE	£56
Z TAPE	£42
Z TERM	£42
Z88 Modem	£149

By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System
(Please telephone for price & availability)

ULTIMUM – Archimedes A3000 Podule Racking System

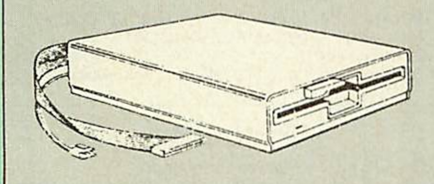
When Acorn originally designed the Archimedes micro, they released to all interested parties the specification of the expansion podule. This has now become the accepted standard for all manufacturers of Archi peripherals. The A300 & A400 both allowed expansion internally up to 2 or 4 podules. However, a newcomer to the affray has caused some upset. A3000 has only a single podule expansion slot, on the outside. There has been deliberation in the industry about a controversial "mini-podule" to be fitted to a special rack. This would entail a re-design of all the available podules onto a smaller board and understandably the manufacturers have rejected the idea completely. As always, Watford have come up with the only real solution to the A3000 expansion problem. The Ultimum Podule Racking System allows up to 3 full size standard A300/A400 series podules to be fitted to the computer. There is also provision for a hard disc drive and podule. Ultimum has its own PSU. There is also an IEC mains output socket for a monitor. It mounts on top at the rear of the computer, and allows direct access to the floppy drive and reset button, rather than obstructing access as on other non standard systems.

Watch this space for launch details.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) £399*(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.
FREE with every BBC Master purchased from us during June

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£115
Econet Module for the Master	£47
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Filestore E01S	£899
Filestore E40s	£749
Filestore E60S	£949
Ecolink	£270

(Carr. £2 to £7 depending on the weight)

Continued→ → → → → → → → → →

MONITORS



MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme £175
- 1451 – Medium resolution, suitable for word processing in mode 0 £219
- Cub3000 Medium Res for A3000 £195
- 1455 – MS Medium resolution, ideal for Archimedes £220
- 1441 – High res, exceeds the capabilities of the BBC Micro £359
- **1431AP** RGB + PAL and AUDIO £199
- **1451AP** RGB + PAL and AUDIO £255
- **2030 CS** 20" Med Res £380
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

14" MULTISCAN COLOUR

- **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen £399
- **TAXAN** 770 LR Low Radiation, auto-scanning Ultra High Res £429
- **TAXAN** Multiscan 870 16" Monitor £575
- **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89 £389
- **EIZO** 9060SZ Low Radiation, Super High Resolution, Antistatic screen, multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch £469

- **TAXAN** Super Vision 3 – High Res 12" Colour Monitor/with green screen switch for wordprocessing
  Special Offer **£179** (While stocks last)

PHILIPS

- BM7502 12" Hi-res Green Monitor £70
- BM7522 12" Hi-res Amber Monitor £71
- CM8833 14" Med. Res Colour Monitor £215

STAR BUY

- **PHILIPS** 14" Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

- **PHILIPS** 14" Refurbished monitor, same as above at a special offer price Only **£120** (Offer valid while stocks last)

Dust Cover for Philips Monitors £6
(Securicor carriage on Monitors £7)

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

CONCEPT KEYBOARDS

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

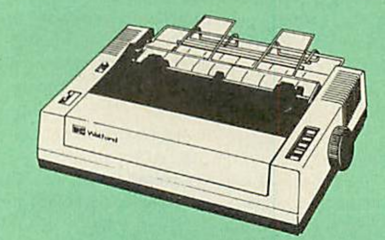
Roland Plotters

(Official Roland Appointed Distributor)

- **DPX 2500** £2495
- **DXY 1100** £595
- **DXY 1200** £835
- **DXY 1300** £1015

Panasonic KX-P1081





SALE OFFER only: **£127**

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every KX-P1081 printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £136

Panasonic Printers

- **KX-P1124** 24pin 80col. 192/63 CPS £215
- **KX-P1540** 24pin 136col. 240/80 CPS £415
- **KX-P1592** 9pin 136col. 216/45 CPS £275
- **KX-P1595** 9pin 136col. 288/61 CPS £345
- **KX-P1624** 24pin 132col. 192/63 CPS £349
- **KX-P1695** 9pin 132col. 330/86 CPS £349
- **KX-P4420** NEW 8PPM Laser Launch Offer £949

- **Panasonic KX-P4450i** LASER PRINTER Latest technology at Watford's special offer price **£1,299**
- Spare Toner £29
- A4 Feeder £55
- Drum Unit £149
- Developer £115
- 1MB RAM Upgrade £299
- 2MB RAM Upgrade £585

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

BUFFERS

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592 £32 **P19** P1124/1180 £55

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£8
P115 for KX-P1180	£8
P145 for KX-P1124	£8
P140 for KX-P1540	£10

Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red **£9.95 each**

INTEGREX COLOUR JET

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- Screen Dump Software £10
- Colour Cartridge £19.50
- Black Cartridge £11.25
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

Citizen Printer Swift 24 £249

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns	£439	NEC P7+ 136 columns	£575
Colour Option	£74	*Serial Interface*	£73
Cut Sheet Feeder	£125		
NEC Ribbons for		P6 £8;	P7 £9.50

Hewlett-Packard Printers

12 months FREE maintenance on site

HP Quiet Jet Plus	£425
HP Desk Jet Plus	£549
HP Paint Jet Colour	£719
HP LaserJet Series IIP	£829
HP LaserJet Series II	£1235
HP Laserjet II TONER	£85
HP Scanjet Plus	£1199
HP Desk Writer	£669
HP Laserjet II	£1275
HP Laserjet IID	£1899
1Meg RAM for Series II	£199
2Meg RAM for Series II	£399
1Meg RAM for Series IIP	£215
2Meg RAM for Series IIP	£449

Star Printers

LC10 Printer	£129	LC24-15	£325
LC10 Mk II	£160	LP8 Laser	£1199
LC10 Colour	£168	XB24-10 r	£379
LC15	£259	XB24-15	£499
LC24-10	£199	XB Colour Kit	£35

Cut Sheet Feeder

LC10/LC24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

EPSON PRINTERS

EX800	£429	LQ860 Colour	£535
EX1000	£564	LQ1050	£540
FX850	£315	LQ1060	£649
FX1050	£385	LQ2550+	£899
FX1060	£679	LX400	£129
GQ5000 Laser	£975	LX850	£179
LQ400	£198	SQ850	£515
LQ850	£439	SQ2550	£869
LQ550	£269		

CUT SHEET FEEDERS for

EX800/FX800/850/LQ800/850	£130
FX1000/LQ1000/1050	£175
LQ2550	£390
LX400/800/850/LQ400/500/550	£69

TRACTOR FEED for

LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90.**

ACCESSORIES

- EX800/1000 Colour Option £45
- EX800/1000 Colour Ribbon £14
- LQ2500 Colour Option £65
- Multifont Card for LQ550/850/1050 £95

(Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM Parallel Lead 6'	£6
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £21
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £19
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

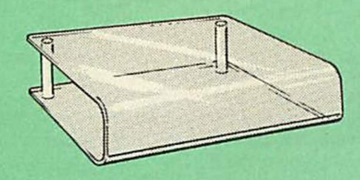
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version **£16** (carr £3)
136 Column version **£20** (carr £4)

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £28 (carr. £3)
132 Column version £30 (carr. £4)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£3.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£3.95	£4.50
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£6.75	£5.00
RX/FX80/85/800/MX80	£3.25	–
FX/MX/RX100/1000	£5.00	–
Kaga/Taxan KP810/815	£4.90	£5.00
LQ500/550/800/850	£4.50	£6.00
LQ1050/LQ2500	£7.00	–
LX80/86/800/850	£3.25	£4.50
M1009/GLP	£3.80	£3.75
NEC P2200	£6.00	£5.00
Panasonic KX1080/81	£3.50	£4.75
Panasonic KX-1124	£8.00	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£4.25	£5.00
Star LC24-10	£5.00	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Universal Printer Sharers/Changer

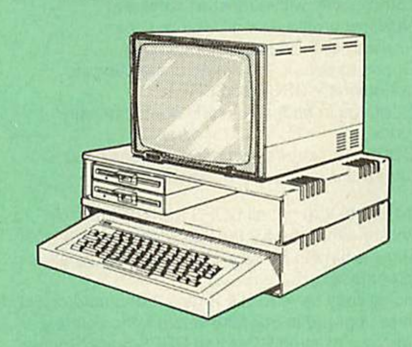
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£20	£22	£3
3 to 1	£27	£30	£3
5 to 1	£36	£39	£4

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



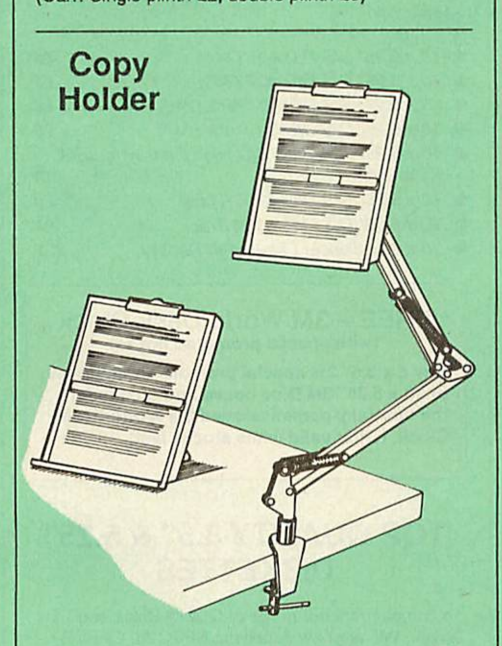
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

Handy Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics	£19
Compact AB Switch RS232	£18

(Cables extra at £6 each)

MEGABUFFER 256



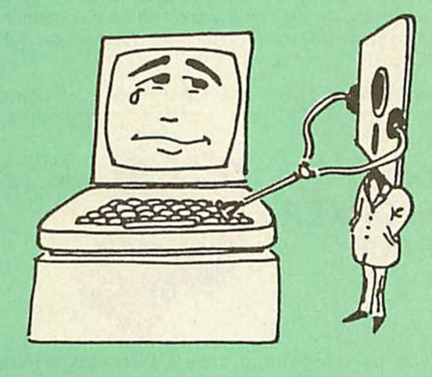
The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

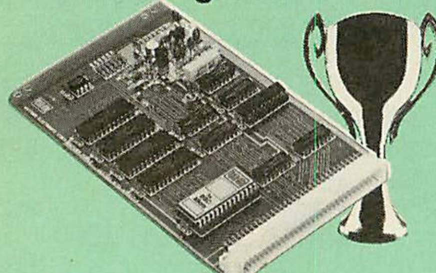
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

(Only suitable for BBC B with 8271 DFS)

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser



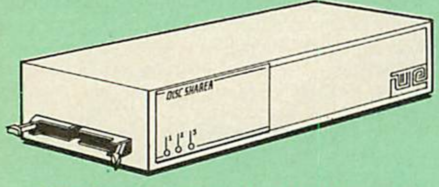
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £215

A Set of Colour Filters for colour image grabbing using a video camera £16
New Risc-OS Software Upgrade £39

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Offer Price : £55 Price includes 3 Cables

DISC PLONKER RACK



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk.
Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2

Acorn & Watford DFSs

- Watford sophisticated DFS ROM £16.00
- Watford DFS Kit complete £69.00
- We will exchange your existing ROM for Watford's ultimate DFS ROM at only £12.00
- DFS Manual (comprehensive) £6.95
- Acorn DNFS ROM £17.00
- Acorn ADFS ROM only £25.00
- Acorn 1772 DFS ROM Kit £49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

- SPECIAL PRICE £44.00
- DDFS Manual (No VAT) £6.95
- We will exchange your existing DFS Kit for our sophisticated DDFS for only £30.00

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

- *10 x 5.25" S/S D/D 40T (744)* £5
- *10 x 5.25" D/S D/D 40T (745)* £7
- *10 x 5.25" S/S D/D 80 Track (746)* £8
- *10 x 5.25" D/S D/D 80 Track (747)* £9
- *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT* £14
- *10 x 3.25" S/S D/D 40/80 Track* £9
- *10 x 3.25" D/S D/D 40/80 Track* £9
- *10 x 3.5" Double Sided High Density* £22

FREE – 3M World Desk Clock
(with special promoted boxes)
Buy 5 x 3.5" 3M special promoted Disc boxes, or 10 x 5.25" 3M Disc boxes and qualify for the specially commissioned 3M World Desk Clock. (Offer valid while stocks last).

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 x* ***M3*** *3.5" D/S D/D 80 Track* £9
- *10 x* ***M9*** *3.5" D/S High Density* £22
- *10 x* ***M4*** *5.25" S/S D/D 40 Track* £5
- *10 x* ***M5*** *5.25" D/S D/D 40 Track* £7
- *10 x* ***M7*** *5.25" D/S D/D 80 Track* £9
- *10 x* ***M8*** *5.25" D/S H/D Hi-Density* £13
- ***M2*** *3" Double Sided* £3 each

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

ANTISTATIC LOCKABLE DISC STORAGE UNITS

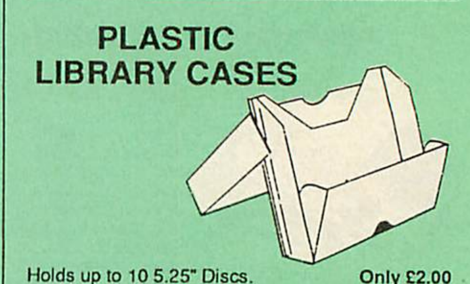


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** – holds up to 50 5.25" discs £4.95
- **M85** – holds up to 95 5.25" discs £6.95
- **M25*** – holds up to 25 3.5" discs £4.95
- **M50** – holds 50 3.5" discs £6.50
- **M10** – holds 8 of No. 10 Data Cartridges £15

* Not lockable

PLASTIC LIBRARY CASES



Holds up to 10 5.25" Discs. **Only £2.00**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

DISC ALBUMS

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)



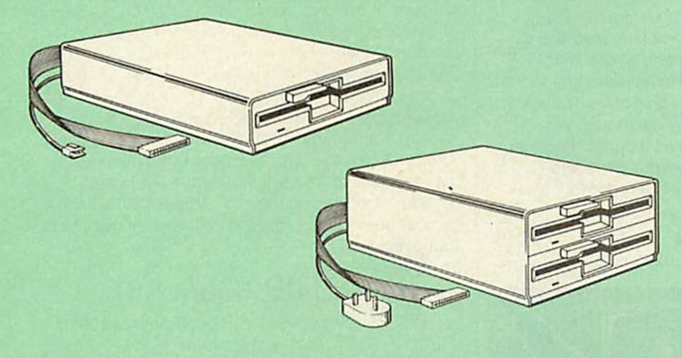
BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
Without Sleeves	£30	£35	£40
With Sleeves	£33	£38	£43

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public. If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.*** *We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. *(Turn to the 4th page of our advert for the Plinths).*
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £74		CS 400S £83	
800K (1,44M		CLD 800S £149		CD 800S £162

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £6 to £7

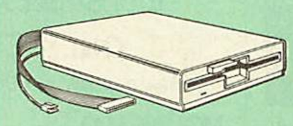
Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5.25" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER



These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

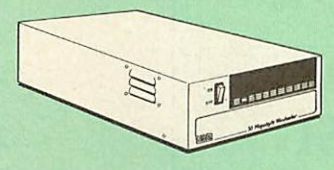
- **CLS35 400K Unit £65**
- **CLD35 Twin 800K £119**

Drives with built-in Power Supply Unit

- **CS35 Single 400K £85**
- **CD35 Twin 800K £129**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

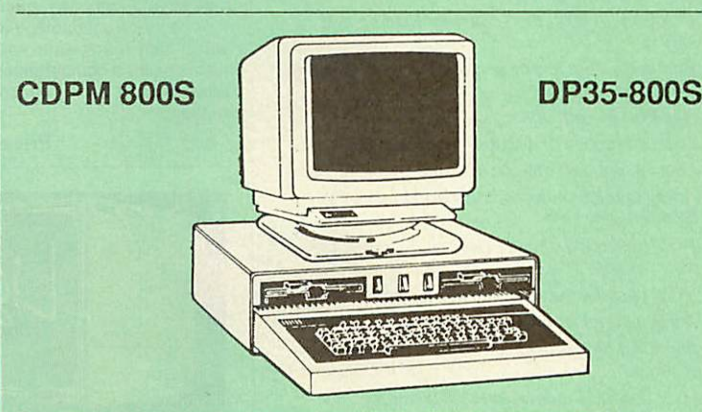
WATFORD's WINCHESTER DRIVES



Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.
This 30 Megabyte hard-disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!
Compatible with the Master, and the BBC B (with 17 X disc interface).

● 30 Megabyte BBC Hard Disc **£395** (carr £7)

CDPM 800S DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

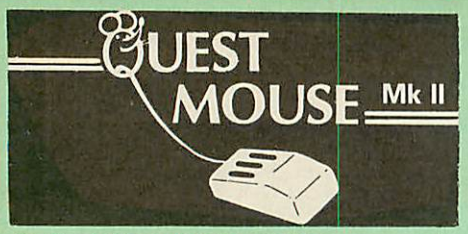
CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.
The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →



- Quest Mouse II & Quest Paint £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse II only £29
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only £22

(P.S. Quest Paint is not compatible with BBC Compact)



Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software



Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)



NEW ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

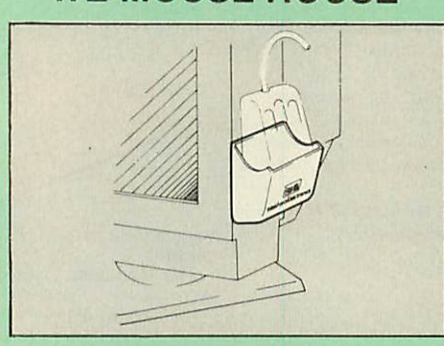
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

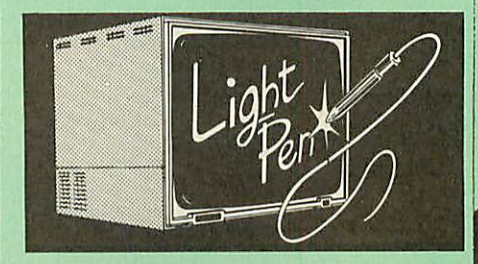
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



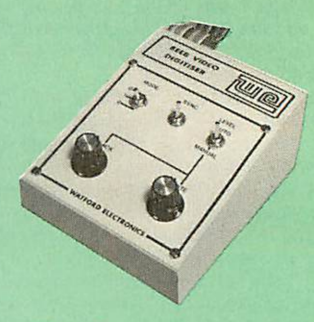
Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser you can convert an image from your camera into a graphics screen on the BBC Micro.
This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.
Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.
Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.
A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

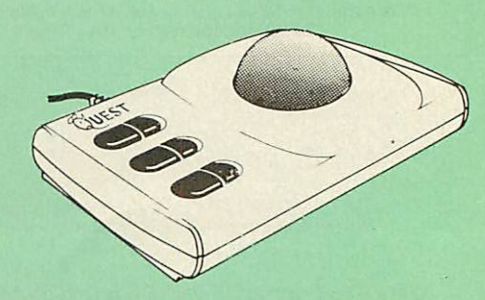
£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

NEW QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version	£32
QT-20 Archimedes Version	£35





Winner of the BBC Acorn User 1990 Award for the Best DTP/ Word Processor

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

cont./-

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

Wapping Editor Software Pack £69
Wapping Editor plus Mouse £89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

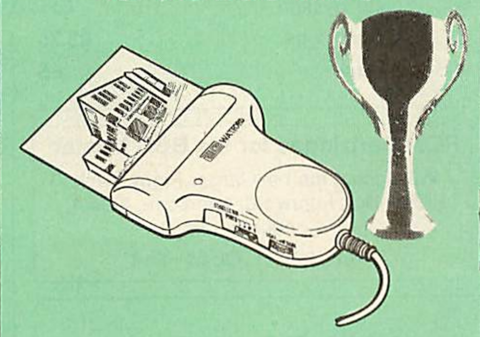
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan
Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware **£135**

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

NEW
Laser Direct
For Archimedes Micro

By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/ envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Launch Offer: £949

(For demonstration, call in at our retail shop)

NEW
Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed. Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

NEW
Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives)

Price: £39

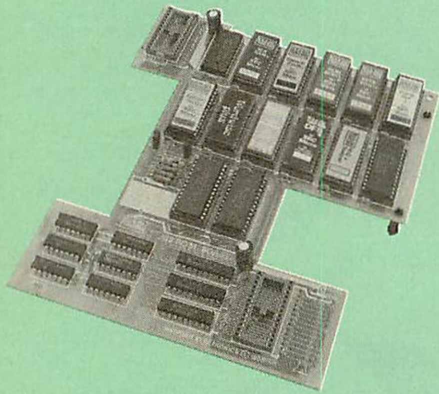
(Please write in for technical literature)

Continued→ → → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/ Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Richard Overfield for interview, or write to us enclosing your CV.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

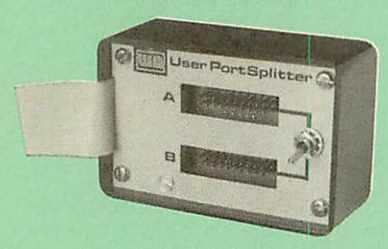
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

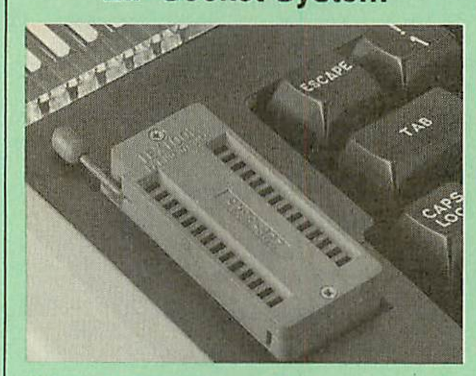
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

Item	Price
Complete System	£11
Spare Cartridges	£2.75
Spare Rack	£1.65

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**



ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£59** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:		
	Aries B-12	£36
	Aries B-12C	£5

ARIES B-488 IEEE-488 INTERFACE UNIT

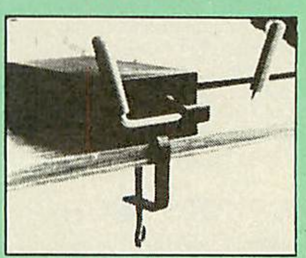
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

VOLTMACE JOYSTICKS

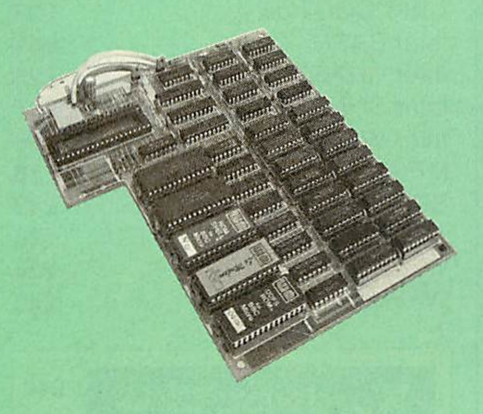
Item	Price
Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

NTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM £48
- ROM/RAM card with 64k dynamic RAM £65
- ROM/RAM card with a massive 128k dynamic RAM £109

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit £9
- 16k Dynamic RAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches ....£2 each

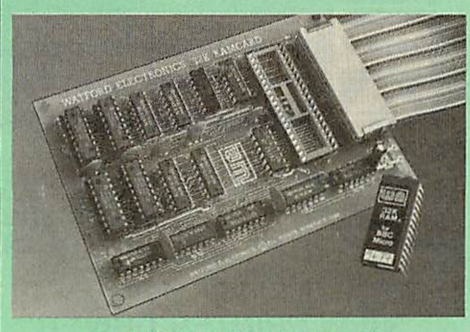
Complete ROM-RAM board All options installed £115

P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £18

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- Maths with a Story 2 (Disc). 4 further maths programs. £11.25
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- POLYMERS (Disc) O-Level program. £20.00
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- FOOD & POPULATION (Disc) O-Level program. £20.00
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Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. £12.00

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Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. £12.50

Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £3)

Continued→ → → → → → → → → →

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OVERVIEW packs 1 & 2	£65
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Epson FX80 & Kaga KP (Disc)	£8
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CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

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All this for only **£21** (Disc)

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- DATABASE
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DISC Version for BBC B & B+	**£14.00**
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(When ordering please specify for which Micro & 40 or 80 track Disc)

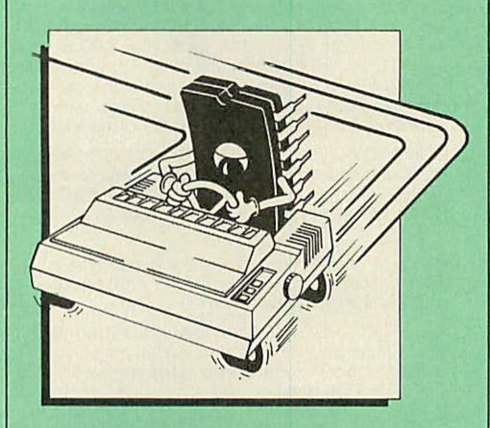


CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Advanced Computer Products

Advanced Disc Toolkit	£28
Advanced Disc Investigator	£24

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

COMPUTER CONCEPT'S ROMS

COMMUNICATOR	**£49**
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Wordwise	**£24**
Wordwise Plus	**£40**

Wordwise plus **£40**

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

BOOK

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

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THE COMPLETE BBC COMPUTER USER HANDBOOK

"Why has no-one written a book like this before? It's long overdue".

If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

GENERAL – Uses and abuses of computers.

HARDWARE – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

HARDWARE RUNNING BBC-BASIC – All BBC machines are described with their differences. Compatibility between the various BBC machines. Networks. The Archimedes and its advantages.

GETTING ORGANISED – So that you keep track of your programs and control of your software. Setting up for easier programming sessions.

NEAT PROGRAMMING – Good style. Writing structured programs. Getting the best from BBC-BASIC, Graphics and screen displays. Speeding up programs. Saving space.

GENERAL PROGRAMMING TIPS AND HINTS – with a multitude of examples (eg input vetting, dealing with dates, blanking out function key messages, error trapping, disabling ESCAPE and BREAK, use of EOR with colour, etc).

DEBUGGING – Specific errors and how to handle them. How to test programs fully.

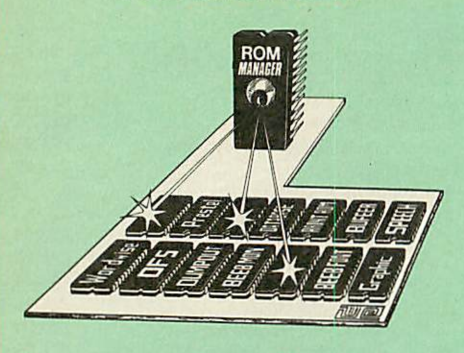
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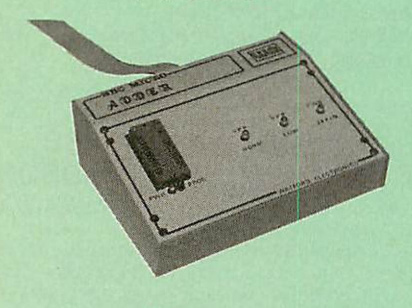
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

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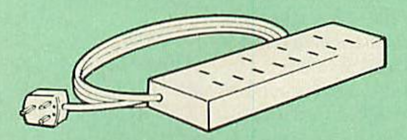
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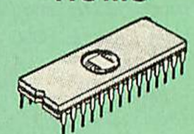
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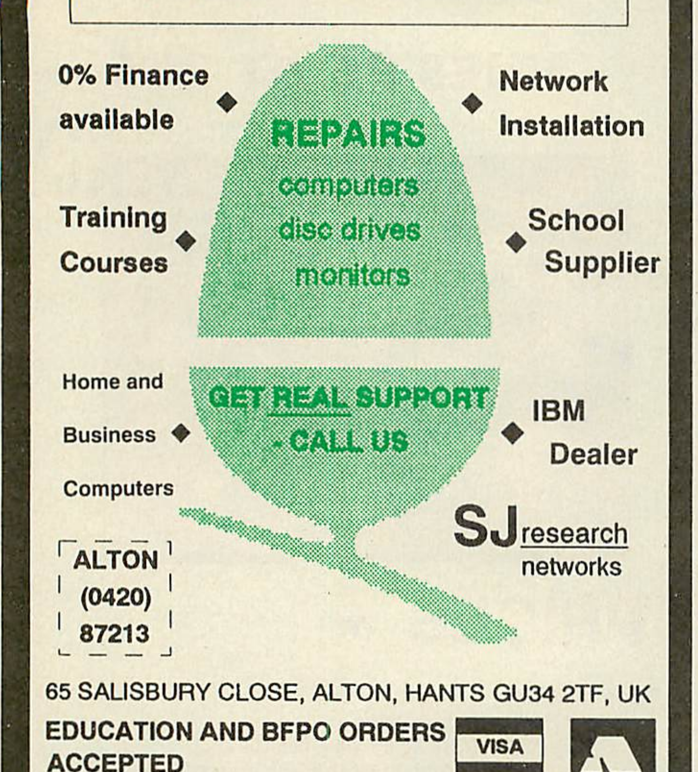
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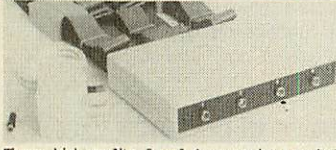
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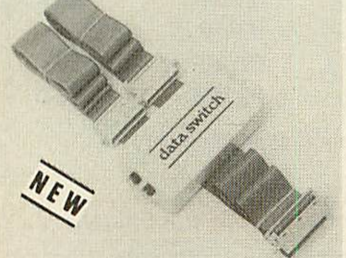
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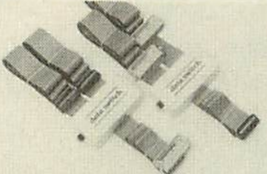


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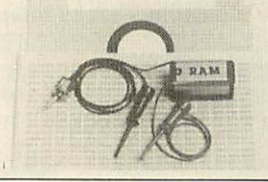
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EIGHT BITS

PRINTER CLINIC

Despite being a somewhat perennial topic, it is clear from my postbag that many readers are still having problems with their printers. So much so that this month the whole column is devoted to a printer clinic.

Most readers have Epson-compatible dot-matrix printers, so it is this type I will concentrate on. There are very few non Epson compatibles around today but even with this compatibility, there are still many problems and inconsistencies.

The single biggest problem everyone discovers with their printers is failure to produce linefeeds – when printing is attempted all output appears on the same line. Sometimes this can be fixed very simply but sometimes it is a real problem.

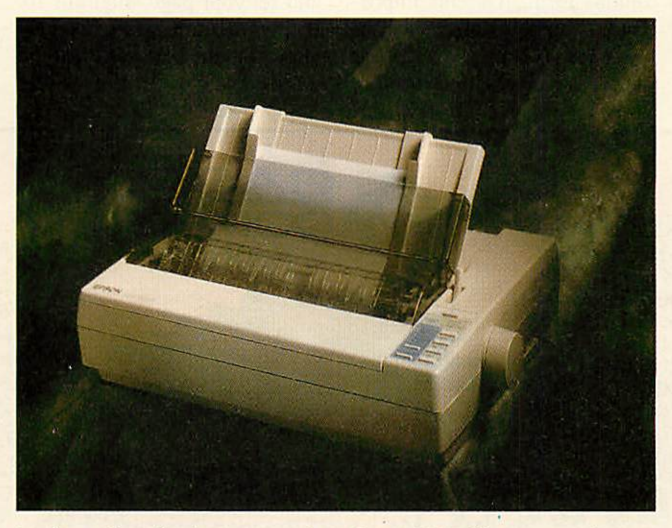
The problem arises because 'carriage return' and 'line feed' are two separate operations as far as a printer is concerned, with two separate codes to perform the actions.

For various historical reasons, the 'line feed' part of the process – rolling up the carriage after the carriage has returned – is sometimes performed by the computer sending the 'linefeed' code and sometimes by the printer assuming the linefeed is necessary because a carriage return has just been received.

Dot-matrix printers are manufactured primarily for IBM-compatible users, as this is the most popular computer in the world and the IBM always sends the linefeed code, whereas the BBC micro does not.

As the printer is not assuming a linefeed, but waiting for the explicit code, it never happens and all the print appears on one line. There are two ways to fix the problem but you should only use one of them (otherwise you will end up with double linefeeding!).

The first method is to make the printer assume the linefeed is necessary. This method has one big advantage – you can do it once and forget it forever – but has a few disadvantages – it is rather fiddly, and a few programs (see below) will not work correctly.



You need to find the printer Dip switch which controls AUTOLF, and set it to On. Changing printer Dip switches should be covered in your manual.

After doing this, the BBC or Master will print linefeeds correctly. The Master (and Archimedes) should have the Ignore character configured to 10. You do this with the *CONFIGURE IGNORE 10 command.

The second method is to leave the printer as it is, with the AUTOLF Dip switch set to OFF, and make the BBC send the linefeed. To do this you type *FX6,0. On a BBC this command must be typed every time you switch on or reset the machine, but on a Master it can be set up permanently with *CONFIGURE IGNORE 0, or just *CONFIGURE IGNORE. (Remember that any CONFIGURE command only takes effect if you press CTRL-BREAK, but you could type *FX6,0 as well to get the effect without resetting).

This is the easier method but for a BBC it needs to be done every time you use the machine.

There are certain circumstances where you still get the wrong result. The first is fairly easy to avoid. Most printers, whether they are set to autolinefeed or not, will do an automatic carriage return and linefeed if you print a character on the last position on the line – the eightieth column on standard width machines. This is very rare with commercial software, and only normally happens if you accidentally set your wordprocessor so the margin plus text width equal 80 rather than 79, or with Basic programs you are writing yourself.

It is of course possible that your software is printing spaces to the end of the line so the printout looks as though it is going only halfway, but in fact it is printing to the end. A quick way of testing whether this is the problem is to set the printer into condensed mode, perhaps from the front panel.

GRAPHICS DUMP PROGRAMS

Another more serious problem concerns graphics dump programs. The problem centres around the use of the VDU1 code which normally precedes every character in a graphics dump. In a graphics dump a line of graphics codes will be issued, followed by a normal carriage return to move to the next line. The carriage return will of course be issued using the normal VDU1,13, and VDU1,10 and this is where the problems arise, because the 'ignore' character is not ignored if preceded with a VDU1.

So if your printer is set to assume linefeeds, and your BBC is programmed to not send them (AUTOLF Dip switch on, and *FX6,10 or *CONFIGURE IGNORE 10) then you may get double line feeds, and the subsequent gap between each line.

The solution to this is to alter the software (if you can) or set your printer up the other way round, with AUTOLF off, and *FX6,0 active.

The second software problem arises on some commercial software because it was written for the BBC and not the Master, and only applies on the Master when you have performed a *CONFIGURE IGNORE (no ignore).

This sets a flag so no characters are ignored and is different

to *CONFIGURE IGNORE 0 which, like *FX6,0, tells the system to ignore the Ascii 0 character.

However, the system call which was used by BBC programmers to read the ignored character, will, when used on the Master, return the last character set to be ignored before you instructed it to ignore no characters at all.

So, if your system was set to ignore character 10, and you typed *CONFIGURE IGNORE to stop ignoring that character, the OSBYTE call which reads the ignored character would still return 10.

There is another system call to check whether a 'No Ignore' flag is set, but it is unique to the Master and a BBC program would make no further check.

So, if your Master system is set to No ignore but printing is all appearing on one line from a particular package, you should CONFIGURE the ignore character to 0, reset, then reconfigure again with no ignore character, and reset again.

A related problem with linefeeds concerns the implementation of the reverse line feed command (ESC"j""). A few programs use this to counteract any linefeeds so that they can roll back and continue.

Only a handful of Epson-compatibles support the reverse linefeed – if you find a program that does this, again, you'll have to switch the printer AUTOLF off and adjust the BBC accordingly.

A4 PAPER PRINTING

Another big problem people have is with the use of A4 paper, both in cut sheet and continuous form. It seems impossible to get sheet after sheet of A4 paper correctly printing without headers and footers 'creeping' in one direction or the other.

The reason is simple – A4 isn't an American size. The American standard size of paper is known as 'Letter' and is 8.5x11in, familiar to all printer owners as the size of standard listing paper. Printers, by default, print six lines to the inch and so print 66 lines on US Letter paper. Because of this, 66 lines is the default page size in most wordprocessors.

A4 paper is 297mm long, which is 11.693in (not 11 2/3in as commonly imagined) which at six lines to the inch produces 70.16 lines of space per page. The simplest solution when using A4 is to allow a reasonable top and bottom margin (above the header and below the footer) and set your page length to 70. If the print head is exactly aligned to the perforation at the top of the first sheet, it will be 0.16 lines 'too high' at the end of the first page, 0.32 lines too high at the end of the second page, and so on.

This means the print head will be a whole line out after six pages, so this is really only suitable for continuous paper (which is not preprinted) up to about four sheets.

If you want to print larger runs on A4 paper, you must compensate in some way for the accumulating error.

The most obvious way of doing this would be to use the feature that all Epson-compatibles have – issuing linefeeds in 1/216in increments.

Continuing with the above example, it is fairly easy to see that if a command can be given at the end of each page to advance the page by 0.16 of a line, the next page will start at the right point.

Simple arithmetic shows us



that 0.16 of a line occupies 0.026 inches, which is 5.67 two-hundred-and-sixteenth units of an inch.

(For clarity I have rounded some of the above figures, but the resultant calculated figures are done using the full precision values).

If you send the code for 6/216in linefeed at the end of the page, the error is reduced from one line 'creep back' in six pages to one line 'creep forward' in 109 pages. The code for 5/216in would 'creep back' one line in 54 pages – that is, a fifty-fourth of a line on each page. This is as close as you can get on A4 fanfold paper.

The code for a 1/216i linefeed is ESC J, so ESC J 6 would perform the desired effect. This is obviously easy to implement in your own programs but how can we do it on a wordprocessor? The normal method is to include the control codes at the end of the footer definition. In *Wordwise Plus* this is particularly easy. If the footer is normally the page number, the definition would be

```
<CE>Page <PP><ES"J",6>
```

(The chevrons show the command on and off keys, f1 and f2, which turn text green or white on screen).

In *View* it is more difficult – you cannot include a control code directly in the footer text, so you would have to use a printer driver generator, and redefine a highlight sequence to work as ESC "J" 6, then use that highlight sequence at the end of the footer.

This may be made easier by the numerous utility products and add-ons for the *View* family.

If you are using a program which allows different footers for left and right pages, you could further refine the error margin by having, say, left-hand pages advance by 5/216in and right-hand pages by 6/216in. This improves the 'creep' even more, leaving a 'creep back' of only one line per 213 pages.

These figures apply to 9-pin dot-matrix printers only. 24-pin printers work on exactly the same principles and with exactly the same codes but their smallest paper advance is 1/180in.

(I have always thought it somewhat strange that the superior printer has a lower resolution of linefeed.)

In the above examples, because 6/216in is the same as 5/180in, using ESC "J" 5 will result in the same 109 pages before the running printout is a whole line out. Using ESC "J" 4 will allow 41 pages before one line 'creeps back'.

An associated point to all this is the use of the 'skip over perforation' code which many people seem to think is useful in the above problems. This feature exists for one type of printing only, which is printing to 11in or 12in paper (the two sizes the printer internally recognises) from a program which has no vertical formatting at all in its output, such as the LIST command in Basic.

You should never set this in normal use with a wordprocessor, nor should you use it at all if you are using A4 paper. It is guaranteed to get things out of alignment.

Vertical printing is less of a

problem with A4 paper, which is 0.23in or 2.77 pica width characters narrower than US Letter paper. By imagining the total sheet is only 77 rather than 80 characters wide, you will be able to set your margins and rulers in improved balance.

CUT SHEET FEEDERS

A4 paper in cut sheet feeders is a totally different matter. When using a cut sheet feeder it is important to remember that whatever the size of the paper (within reason) the printable area is fixed.

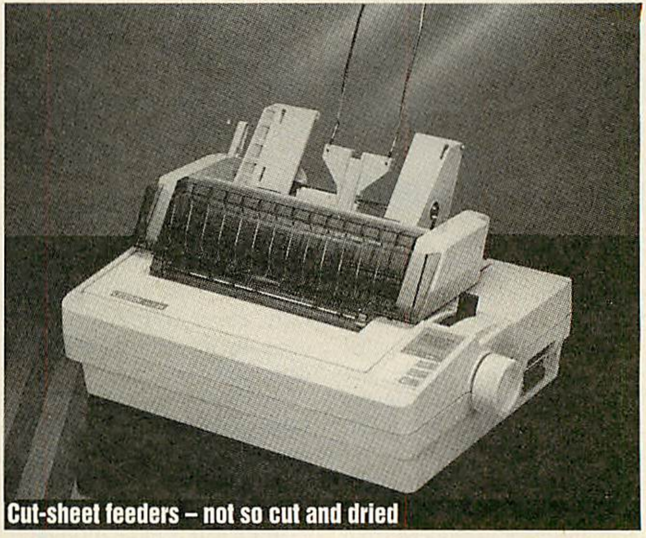
On most Epson compatibles working at the normal six lines per inch, this is 56 lines. Unlike the continuous paper, printer manufacturers seem to have recognised the existence of A4, and most feeders correctly allocate the 56 lines by rolling the paper down by eight lines, leaving a seven line margin at the top and bottom.

If using a cut sheet feeder, you should set your page length in your wordprocessor to 56 lines, and set the top and bottom (not header and footer) margins to zero, unless you want even more than seven lines at the top and bottom! That's really all there is to it.

If you are having problems with a cut sheet feeder, remember that for the feeder to work correctly, and avoid creeping, blank pages and so on, there should be no character output between the carriage return on the last line of the 56 lines (the page footer, or last line of text if there is no footer) and the first character on the top of the next page. If you test exactly the same document on fanfold paper, it should all run together on consecutive lines.



The popular Star LC-10



Cut-sheet feeders – not so cut and dried

The only other difference is that a form feed command to a cut *sheet feeder* always rolls up to the correct position on the next sheet, not to what the printer thinks is the end of the page, as on fanfold.

This means programs which perform linefeed corrections, such as the one above, should not be used.

DOWNLOADABLE CHARACTERS

Another problem that perplexes many people concerns downloadable characters. Their printers have enough Ram to download characters and they eagerly get hold of character defining software but the downloaded characters fail to materialise.

This one is very simple to solve. Virtually all printers offering this feature contain 8K of Ram which can be used either for download characters or for a printer buffer, controlled by one of the Dip switches. Invariably the printer is factory set to use the Ram as a buffer, as this is the more common use. Another 'read the manual' situation, it would seem!

One final popular problem. The Star LC-10 colour printer is one of the most popular colour machines around due to its very low cost but many of you have discovered once you have bought the machine that it is far from automatic to get colour output from it.

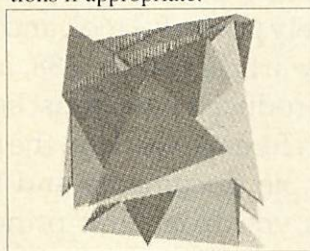
The printer is compatible with an obsolete colour Epson model, the JX-80. A set of BBC dumps are on the *BAU* October 1985 monthly disc (see how far ahead of our time we were!) and a snapshot dump is available in the *BAU Userdump* Rom.

For text work, the standard ESC commands (ESC "r" <colour number>) to change colour in the text can be inserted using the ES command in *Wordwise* or through a redefined highlight (see above) in *View*.

You may be interested to know that the Citizen Swift 24 and new Swift 9 printers have an optional colour upgrade (unlike the Star LC10, this can be fitted later to the mono machine) and these two work with the BBC dumps we did in 1985.

When used with these programs, the Swift 24 does what all 24-pin printers do if a 9-pin dump routine is used – elongate the picture by 20 percent (a ratio of 216:180 because of the deeper minimum feed) and of course the software only works at 9-pin 'quality'.

That's all for this month. Next time, it'll be back to the regular format of readers' submissions. I'm glad to see that you're starting to send me application and user tips, as opposed to purely technical bits and bobs, but more still please, including listings and bootable demonstrations if appropriate.





A 24-pin printer will print a 9-pin dump (top) stretched out by 20 percent (bottom), and at 9-pin quality

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Z88 PipeDream: A Dabhand Guide

Z88

from John Allen - expert Z88 journalist

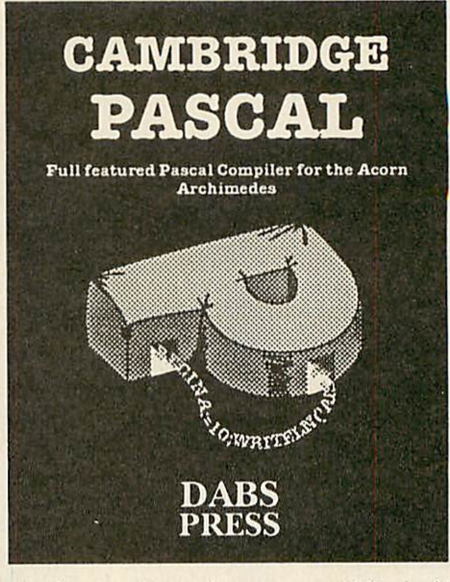
PipeDream, the built in word processor, spreadsheet and database built into the Z88 is an extremely powerful tool, and John Allen, author of many articles of the Z88, and experienced user has produced what must be the ultimate tutorial and reference work on the software. With many example documents and templates, this book takes you from first principles to a thorough understanding of the program. Linking to PipeDream on other machines such as the BBC and Archimedes is also covered.

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WINDOW SHOPPING

Jealous of the Arc? **ALAN BLUNDELL** has the windows program for the Master to even things up a little



Windowing environments are all the rage these days. From Apple's Macintosh computer, which first popularised 'Wimps' (the now-widespread Window, Icon, Menu and Pointer 'user interface') to Acorn's own Archimedes series, windows have become a fact of computing life. There are a lot of points in favour of this approach, as anyone who has used such an interface will know.

'Windows' are an enhancement to the computer's screen display which allow panels to be temporarily overlaid with, for example, a menu of choices or some explanatory text. Programs such as AMS's *Super Art* and *Stop Press!* and the Computer Concepts' *Inter* series make effective use of windows, and *BBC Acorn User* has featured a number of articles on windows-related topics, particularly for the Archimedes. When I read all of these and thought about my trusty model B, I have to admit to feeling more than a little envious.

Having recently upgraded from a model B to a BBC Master 128 computer, I decided to see what I could do in the way of windowing using the extra features of the Master series – in particular, 'Shadow' screen memory, sideways Ram banks and the extensive documentation of VDU variables in the Master's manuals.

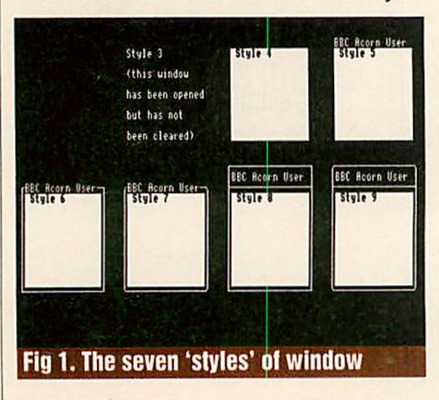


Fig 1. The seven 'styles' of window

Sensibly putting to one side the idea of recreating the Macintosh interface in BBC Basic (I know my limitations!), I put together the following 'wish list' of features I would like to see:

- a choice of window design (with borders, title bars, a choice of colours, etc.).
- the ability to have more than one window on-screen at the same time, and to switch between current windows.
- fast opening and closing of windows, with no after-effects on the screen display
- windows to be usable for both text and graphic displays.
- proper use of shadow Ram to allow the use of windows in all screen modes (except, perhaps, teletext modes).
- windows which would cope properly with scrolled screens.
- little or no interference with user Ram.
- no restrictions on window size.

I looked at this list of desirable features and resisted the temptation to add others such as icon displays, automatic menu bars, scroll bars and so on. This list is sufficiently ambitious. The program would obviously need to be in machine code for speed and compactness and would preferably be in the form of a Rom 'image' so it could be loaded into, and used from sideways Ram.

Since it was to be in sideways Ram anyway, I realised that I could reduce the impact on 'user memory' still further by putting the screen data stored when opening a window in the same bank of sideways Ram.

Also, the stored data would have to be compressed in some way, because it would not take long for even a couple of relatively small windows on, say, a mode 0 screen to fill the available space (given that a mode 0 screen occupies 20K of memory, and a full sideways Ram bank is only 16K – not counting space taken up by the program itself!).

After giving some thought to the choice of styles of window which I wanted to have, I decided that it would be a good idea to make use of the Master's extended character set. These were thoughtfully added by Acorn to the character set to make better

use of the private Ram on the Master, giving a 'fully exploded' set. These characters make it simple to draw lines and boxes without resorting to graphics commands or defining your own characters.

I finally settled on a range of seven 'styles' of window, as shown in figure 1. While I was at it, I allowed for the specification of different foreground and background colours for the border and title bar (if used) and the window itself.

```
OSWORD Call with A=&2Ø (32):

block?Ø=Ø  Close any and all open windows
block?1=1  Close last window opened
block?Ø=2  Release last window opened
           leaving it on screen
block?Ø=3  Open a window, but don't clear
           it or set colours
block?Ø=4  Open a window, clear it and set
           colours
block?Ø=5  As 4 with a title bar
block?Ø=6  As 4 with title bar and squared
           frame
block?Ø=7  As 4 with title bar and rounded
           frame
block?Ø=8  As 4 with boxed title bar and
           squared frame
block?Ø=9  As 4 with boxed title bar and
           rounded frame

*WFREE     print size of remaining free
           window data storage space
*WCLEAR    reset WindRAM, no effect on
           display
*WBACK     make previous window active
*WFORE     make next window active
```

Table 1. WindRam commands

All of these choices made the use of standard 'star' commands a bit unwieldy, what with one parameter for the style, four for the window's size, up to six for its colours and another for its title. In the end, the program uses a previously unused OSWORD call, catered for by the operating system, to take its instructions.



The program

Armed with a pot of strong coffee and an armful of manuals, I set to work. The result was listing 1 in the yellow pages. Because of the complexity of the problem, the program is very long – not for the faint of heart! If in doubt, the easy way of getting the full program working is to buy this month's program disc.

Listing 1 is the assembler source code for a machine code sideways Rom image which it saves under the name *WindRAM*. The image is about 2.5K long.

When loaded into any of the Master's sideways Ram banks it leaves about 13.5K of the bank free to hold compressed screen data. *WindRAM* includes code to deal with four of the standard calls made via the sideways system by the OS:

- HELP calls. The program will respond to *HELP WINDOWS (or *H.W.) with a short summary of the features available.
- Notification of BREAK. This call is used to clear the data buffered in sideways Ram. As the screen display has already been lost when BREAK was pressed, the buffered data is no longer of any use.
- Star commands. The program provides four new commands: *WFREE, *WCLEAR, *WBACK and *WFORE. The use of these is summarised in table 1.
- OSWORD calls. The program checks for OSWORD calls issued with A=32 (&20). If the call is recognised, the parameter pointed to by (XY+0) is used to determine what action is required.

Table 1 summarises the options available; these include closing and releasing windows, together with the seven styles of window described earlier.

Don't worry if you are unfamiliar with operating system calls. You don't need to know about OSWORD to use *WindRAM*. Later, we'll look at how calls can be made from your own Basic programs.

As each window is created, a 'header' is set up in sideways Ram to hold information about the window and the state the screen was in before the window was opened. Table 2 describes the contents of the header for those interested in the technical details. Much of the information stored in the header is obtained either directly or indirectly from the VDU variable workspace maintained by the operating system in page 3 of memory (from location &300 onwards).

BYTE(S)	CONTENTS	NOTE
Ø	28	VDU 28,L,B,R,T
1	text window left	
2	text window bottom	
3	text window right	
4	text window top	
5	17	VDU 17,X
6	text foreground colour	COLOUR x
7	17	
8	text background colour	
9	31	VDU 31,X,Y
1Ø	text cursor X	
11	text cursor Y	
12	29	VDU 29,X;Y;
13-14	graphics origin X	
15-16	graphics origin Y	
17	24	VDU 24,L;B;R;T;
18-19	graphics window left	
2Ø-21	graphics window right	
22-23	graphics window bottom	
24-25	graphics window top	
26	18	VDU 18,M,C
27	foreground plot mode	GCOL M,C
28	foreground plot colour	
29	18	
3Ø	background plot mode	
31	background plot colour	
32	25	VDU 25,4 (MOVE X,Y)
33	4	
34-35	previous point X	
36-37	previous point Y	
38	25	
39	4	
4Ø-41	current point X	
42-43	current point Y	

Table 2. Window information block

The header is refreshed each time it is accessed so if, for example, you were to change the colour of a window and then temporarily switch to another, the changed colour would still be in effect when you switched back again.

Following the header block, the screen data for the area covered by the window is stored in compressed form.

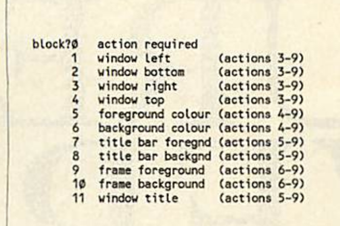
This allows a certain amount of freedom in sizing of windows, providing that the original screen display is not overly detailed.

By using a few bytes of the sideways Ram bank at the end of the code for storage of its internal variables, and only zero-page workspace allocated by Acorn for use by sideways programs during the processing of commands, *WindRAM* uses no user Ram at all.

As screen data is read and written only using the operating system's OSWRSC and OSRDSC routines, compatibility with normal and shadow display memory is assured.

Table 3 summarises the details which *WindRAM* expects to find in the OSWORD parameter block.

Note that not all of these need to be specified in every case – for example, if the window is a simple rectangle without title bar or border,



block?0	action required	
1	window left	(actions 3-9)
2	window bottom	(actions 3-9)
3	window right	(actions 3-9)
4	window top	(actions 3-9)
5	foreground colour	(actions 4-9)
6	background colour	(actions 4-9)
7	title bar foregnd	(actions 5-9)
8	title bar backgnd	(actions 5-9)
9	frame foreground	(actions 6-9)
10	frame background	(actions 6-9)
11	window title	(actions 5-9)

Table 3. OSWORD 32 Parameter Block

CODE	MESSAGE	ROUTINE
64	'No window active'	*WBACK
65	'Last window already active'	*WFORE
66	'No memory for window data'	OSWORD calls with A=3-9
67	'No window open'	OSWORD calls withA=1-2
68	'Not suitable for teletext'	OSWORD calls with A=5-9
69	'Parameters'	OSWORD calls with A=3-9
17	'Escape'	all printing messages

Table 4. Error codes and messages

the parameters at block?7 onwards do not need to be specified.

Table 4 summarises the error codes and messages which *WindRAM* can produce. There aren't many, as the program checks for and corrects many problems itself. But a program as complex as this has to have some way of handling 'fatal' errors.

Using the program

To install *WindRAM*, the following procedure should be followed. First, type in or load listing 1 (and if you've gone to all the trouble of typing it in, save it!).

Run the program. If all is well, the *WindRAM* image will be automatically created and stored on disc (or even tape). Type *ROMS to see which of your sideways Ram banks is not currently in use by other programs and then type:

```
*SRLOAD WindRAM 8000 X
```

where 'X' should be replaced with the number of your free bank of Ram. Finally, press CTRL-BREAK to activate the image.

WindRAM should now be installed and ready to work. To try it out, type *HELP WINDOWS. If all is well so far, all you need is a program which makes use of windows.

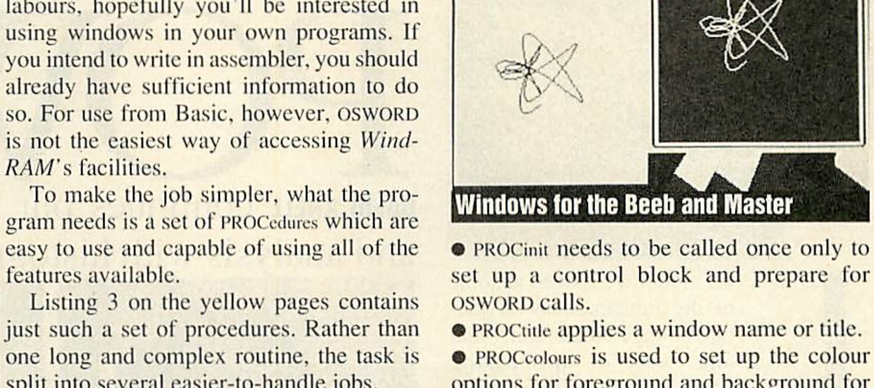
Listing 2 on the yellow pages is a demonstration of some of the features of *WindRAM*. Once the program is installed, the demo can simply be chained. Then, sit back, watch, and take a well- earned rest!

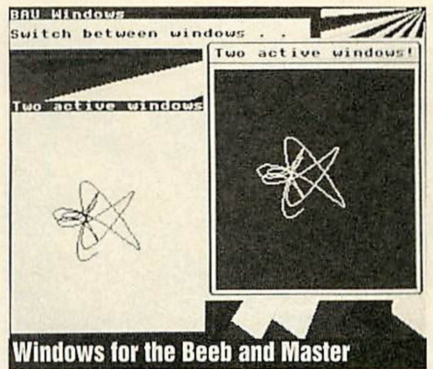
Once you've seen the fruits of your labours, hopefully you'll be interested in using windows in your own programs. If you intend to write in assembler, you should already have sufficient information to do so. For use from Basic, however, OSWORD is not the easiest way of accessing *WindRAM*'s facilities.

To make the job simpler, what the program needs is a set of PROCedures which are easy to use and capable of using all of the features available.

Listing 3 on the yellow pages contains just such a set of procedures. Rather than one long and complex routine, the task is split into several easier-to-handle jobs.







Windows for the Beeb and Master

- PROCinit needs to be called once only to set up a control block and prepare for OSWORD calls.
- PROCtitle applies a window name or title.
- PROCcolours is used to set up the colour options for foreground and background for the window itself, any title bar and/or window 'frame'.
- PROCwindow is the main procedure which actually creates a new window of the size and style specified.
- PROCcloseall simply closes any and all windows which are open.
- PROCclose closes the last window opened.
- PROCrelease removes the window header and screen data for the last window opened from sideways Ram store – like PROCclose, except the window itself stays on the screen.

To use windows in your own application, simply append this standard set of procedures to your program and insert the appropriate calls into the main part of the program.

If I ever recover from writing *WindRAM*, I may yet follow up this article with an application program. The ideas I have in mind at the moment include a windows-based, real-time pixel editor for graphics screens, a windowing version of one of the art programs published in *BAU* and a DFS/ADFS 'front end'. In the meantime, I look forward to seeing what readers can produce – I'm sure there are plenty of other uses you can think of.

THE MODEL B

Thanks to Acorn's consistency in the evolution of the BBC micro series operating system, *WindRAM* contains code to a large extent compatible with the BBC model B.

If you are the proud owner of a model B and have at least one bank of sideways Ram (such as the *Acorn User UserRam*), you may be able to adapt *WindRAM* for your own use. The following features of the Master cause some problems, but nothing which a little effort can't overcome.

The program uses some new assembler commands for the 65C02 microprocessor. Only the commands PHX, PHY, PLX and PLY have been used. These could be replaced at each occurrence with, respectively, TXA:PHA, TYA:PHA,PLA:TAXand PLA:TAY.

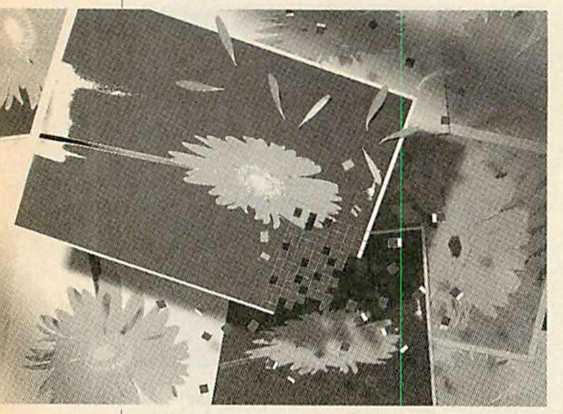
The character set is not fully expanded on a standard model B so it would be necessary to define the 'box' characters using VDU23 each time the program was used.

The VDU variables in the workspace at page &3 of memory are not in precisely the same format.

Some changes would be necessary to ensure graphics colours are stored and restored correctly (no other variables are affected).

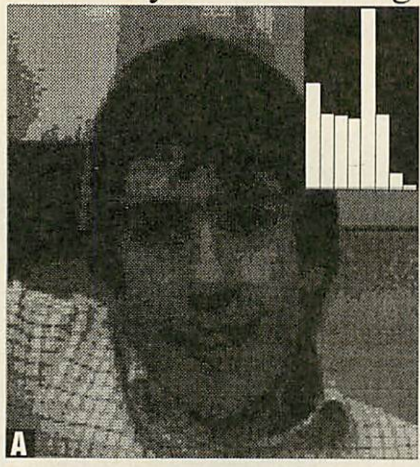
However, the program is long enough for *BAU* already so these conversions will have to be left as an exercise for the reader.

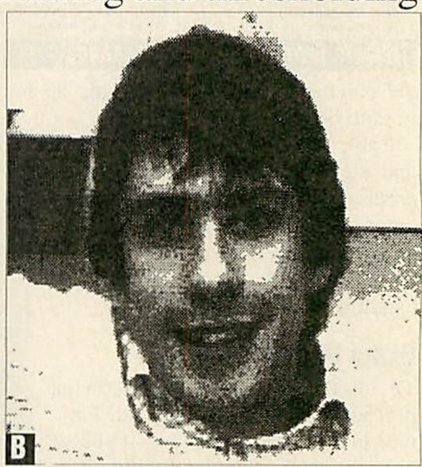
For details of the changes necessary, I recommend reference to one of the more advanced manuals, such as *The Master Operating System* by David Atherton, published by Dabs Press.



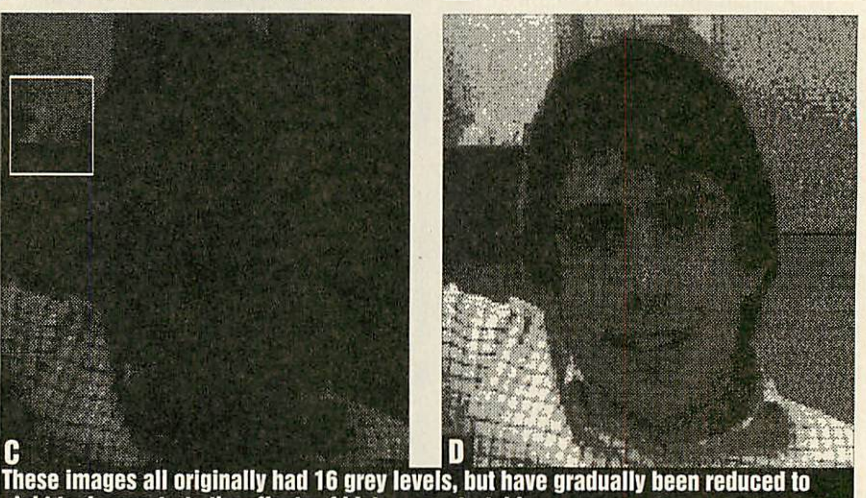
PICTURE POWER

DAVID KNELL continues our look at image processing and analysis with histogramming and thresholding









These images all originally had 16 grey levels, but have gradually been reduced to eight to demonstrate the effects of histogram stretching

Last month we looked at some of the fundamentals of picture storage on computer and one way of processing images. Convolution provides you with a powerful image processing tool. It can be used to sharpen images, detect edges, remove noise and so on. However, it only addresses local processing problems. Global problems (those involving the whole image), such as underexposure, require different methods.

A couple of very powerful techniques involve the use of histograms. A histogram is essentially a bar chart (see figure 1 which shows the beer consumption per person per week in Cloudcuckooland). For image processing purposes, the term histogram acquires a more specific meaning than usual.

It shows the number of pixels per grey level in the image. This lets you see whether the image is underexposed (too many pixels are dark) or overexposed. By manipulating the histogram of an image, you can bring out detail which otherwise would escape notice. The first method to be examined is known as 'histogram stretching'.

Histogram stretching involves expanding a part of the histogram so that it fills the whole available range. This involves a compromise. By expanding some of the histogram, you have to compress the rest to allow it to fit into the same range as before. But provided the detail you want to bring out lies in the expanded portion, then this will be more distinct than the original.

To see what can be done, look at the pictures of the face. These images all originally had 16 grey levels but have been reduced to eight to demonstrate the effects of histogram stretching more clearly. The first image, the original, fairly clearly shows a face. Its histogram is also shown. Note the large peak at mid-grey: this corresponds to the large area of grey background. Note also that there are very few white pixels in the image – this indicates an image which has been slightly under-exposed.

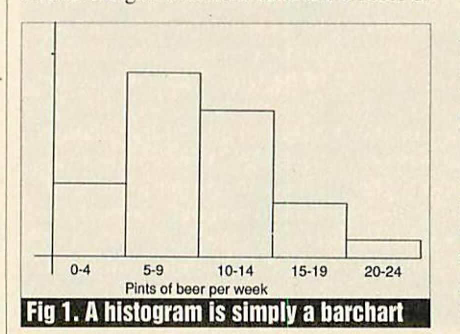


Fig 1. A histogram is simply a barchart

The second picture shows the same image but with the histogram stretched so that the darkest four grey levels occupy the whole available range. Anything lighter than these is shown as full white. The face is much improved by this stretching but the shirt and background detail is washed out.

The third image shows the result of expanding the lightest four grey levels to fill the entire range. At first sight, this isn't nearly as good as the other stretching – the face has been entirely wiped out. However, the pattern on the shirt is clearer than in the original. More significantly, some detail has emerged which was invisible in the original. The shape of the contents of the dustbin (inside rectangle) can be seen, whereas it blended into the original's background.

Let's have a look at the code for these functions. The procedures are written in a similar fashion to last month's, so they can be used on any type of image just by chang-

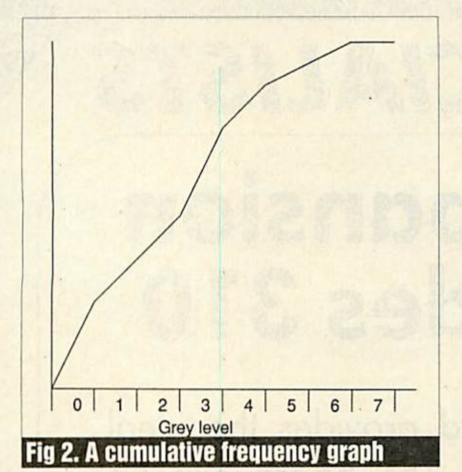


Fig 2. A cumulative frequency graph

ing the ReadPixel and WritePixel functions.

The first pair of procedures, PROCImageHistogram and PROCPlotHistogram calculate the histogram of an image and draw it as a bar chart on-screen, respectively.

The second routine, PROCStretchHistogram, allows you to stretch a histogram in the way described above. It allows you to specify a portion of the histogram which it then expands to fill all of the available grey levels, with pixels with intensities outside this range being forced to either black or white. Note that a small random perturbation is added to the pixel value read (0.5 either way) to help spread the intensities in the

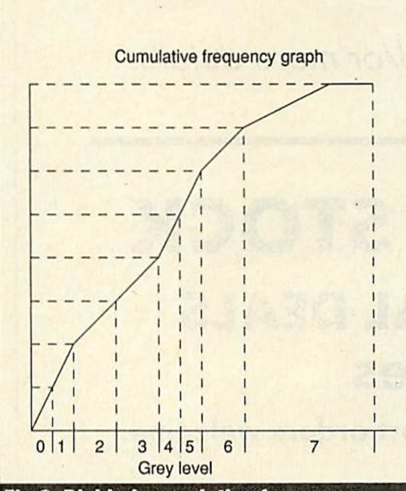


Fig 3. Divided cumulative frequency

stretched image over the available range, improving the look of the final image.

The next technique is histogram equalisation. Often images contain more dark pixels than light ones, or vice versa. This means you don't get the best value from the available shades of grey as some are underused and some overused.

You can rectify this by using histogram equalisation, which produces an image with a flat-ish histogram, and hence a roughly equal number of pixels with each grey shade.

So how do you achieve this? Firstly, you calculate the cumulative frequency graph for your histogram. This sounds complex, but it isn't (see figure 2).

Now the clever bit: divide the frequency scale into as many equal portions as you have grey levels and draw horizontal lines until they hit the graph and then down until they hit the grey level axis (figure 3).

From this you see that if you redistribute the pixels so that those with a grey level between 0 and 0.5 get set to level 0, those between 0.5 and 1 to level 1, those between 5 and 8 to 7 and so on, you will effectively straighten out the cumulative frequency graph. Hence you will have an image with the same number of pixels in each bit of its histogram, which is the desired effect.

Take a look at the equalised version of your original picture. It shows both of the improvements of the stretched versions, in that the face looks significantly better and the dustbin contents are visible, without losing as much of the detail.

The code to perform histogram equalisation is the third listing given. Note that it won't work on its own. It needs the procedure to calculate a histogram as well.

The routine is straightforward in operation. First the cumulative frequency graph for the image histogram is calculated. Each pixel then has a dither value added, and the number of pixels below it on the graph is found. This value is used to determine what shade the resulting pixel should be.The two methods of image processing seen so far, convolution and histogram manipulation, are very different. One alters local properties of an image and the other global ones.

Image analysis

Image processing is powerful – it can give you a glimpse of the contents of a bin which would otherwise have remained hidden! Image analysis attempts to take the process further and extract information.

The kinds of question which image analysis can reliably provide answers to are quantitative – how many objects are there in this scene and what is their average perimeter? Qualitative problems (such as: who is this a picture of?) are typically much harder.

The first stage in an image analysis is to identify which parts of the image are object and which are background. A surprisingly powerful technique is 'thresholding', where a pixel is marked as being part of an object if it is darker (or lighter) than a threshold grey level, and as background otherwise.

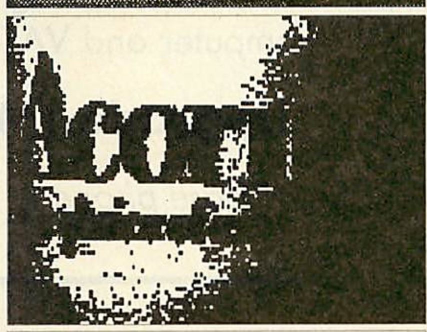
Thresholding can be regarded as taking a grey level image and producing a black-and-white one. It is a useful technique because it unambiguously labels pixels as being part of an object or not, providing a useful base for further image analysis.

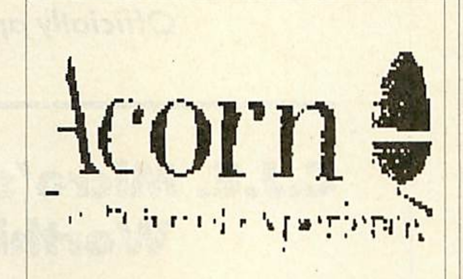
Listing 4 in the yellow pages shows the thresholding routine, which compares each pixel with a pair of threshold values and sets it to 0 or 1 appropriately.

The only variable with thresholding is where to set the threshold. In practice, you want to threshold so that objects in which you are interested are marked as being such and the background isn't. The second set of images show what happens as the threshold is varied. If the threshold is set too low, too much gets selected, too high and objects are lost. The middle setting is about right.

Next month we'll look at thresholded images and some examples of real-life image analysis. Until then, here's a problem. Given a thresholded object, find the pixels which make up its boundary (from this, you can then calculate its area, perimeter and what have you).



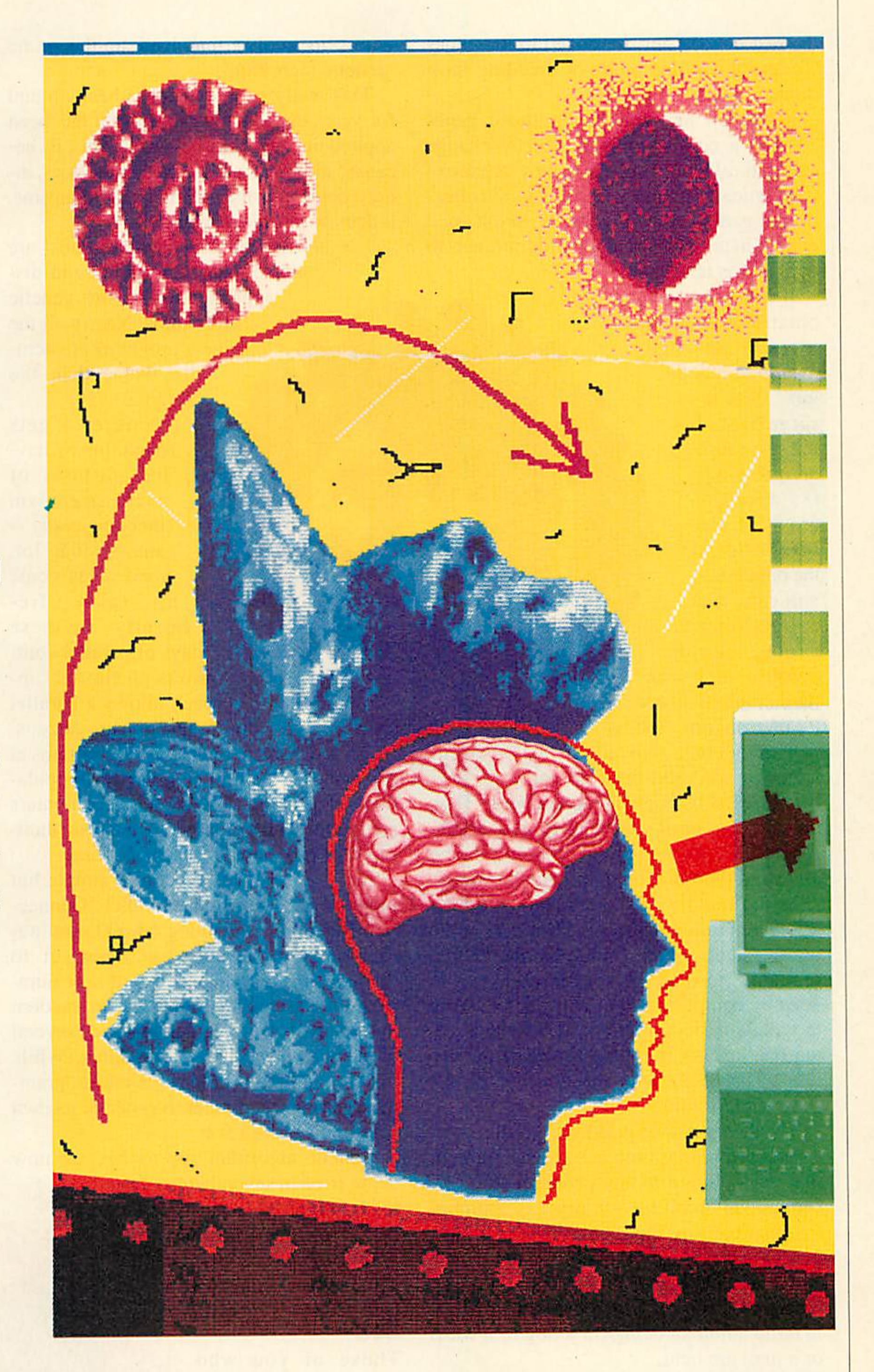


Thresholding – a powerful image processing technique where a grey level image is taken and a black and white one is produced

SEX AND THE SINGLE MICRO

Are computers able to program themselves? **WILLIAM BAINS** looks at so-called genetic algorithms



Here's a knotty little problem for you. You type into your Archimedes the series: 1,1,2,3,5,8,11. Now it has to guess the next number in the series. Anything under a 75 percent success rate is a failure.

Any guesses for how long it would take you to program?

There is another, simpler method of doing it, and you have probably already implemented this solution in the time it has taken you to read this far.

You can do it yourself

Why is it so much easier to solve such a problem yourself, when calculating square roots or searching a database for a keyword is a task rational people leave to a computer? Because you already have the algorithms for things such as finding regularities in series or calculating trajectories or recognising faces, in your head.

So, for that matter, have dogs or chickens, who make poor programmers at best.

We have all evolved to have a large repertoire of in-built algorithms for realtime problem solving but no-one ever sat down and programmed us. Those algorithms evolved through natural selection, as did all

the rest of us. They are coded in the genes which four billion years of breeding have donated to us.

Evolution has worked on those genes through a combination of genetic change and natural selection. Each new organism is genetically unique – it has a new collection of genes, a new algorithm. Is it a good one? There is no master programmer to say, so it is tested out.

If one gene, or combinations of genes, gives it an edge over its competitors, then it is successful. It leaves more offspring. After a while, most of the offspring in the population will carry that collection of genes, simply because they and their children do better than anyone else.

Then another innovation arises to add onto the first and that sweeps through the gene pool. Then another. By this stepwise approach, organisms which are very good at simply being alive and reproducing dominate the world.

In the middle of the century computer scientists started to ask whether they could use the same approach to avoid the tedium of finding good algorithms for solving problems by computers. Why, instead of trying to write a perfect program, just write a rotten one and let it evolve to (near) perfection? Thus was born the concept of the genetic algorithm.

The theory behind genetic algorithms was formalised a long time ago. It was thought that any solution to any problem could be formulated as a string – a string of arithmetic operations, a list of rules, a large number. This is formally the same as our genes, which are strings of 'bases' – the building blocks of DNA, in which the plans of how to build a human being (or a dog or a wasp or a tree) are held.

Natural selection is the best process by which new strings of DNA are generated and then tested for their ability to solve the great problems of life, the universe and everything, or at least to stay alive until you have a chance to create more genes by breeding.

So the genetic algorithm approach is to create a whole lot of new programs based on the best you have come up with so far, and then test them for their 'goodness' at solving some problem.

It is this analogy between how genes evolve and how you might get your programs to evolve that lead to the name 'genetic algorithm'.

This really simple idea has been around for years but it is only recently it has been applied in any sensible way. This is because, although natural selection does indeed come up with well-adapted organisms, it does so very inefficiently.

Nearly all the 'new programs' are worse than the original and disappear. So it is with genetic algorithms. Nearly all the new programs are actually worse than the original.

Nature gets round this by having millions of each organism breeding away – among that lot, good ideas come up fairly frequently. In these days of parallel computers a similar approach allows a parallel computer to run dozens, even thousands of programs at once, so simulating such a 'population' of programs. Even serial computers are getting fast enough to analyse thousands of programs in acceptable time.

Early trials, have been fairly simple but impressive. The highly parallel 'Connection Machine' containing 64,000 semi-autonomous processors has been set to 'evolve' a program which will sort numbers into ascending order. From random bytes it evolves implementations of several of the known ways of sorting things. While this is a simple problem for the programmer, getting a computer to generate its own solution is quite a feat.

Genetic algorithm approaches are now being tried in several areas, from looking for algorithms which will predict stock market values to optimising car aerodynamics to reduce wind noise.

Sex

Those of you who started reading here, go back to the beginning.

There are two parts to a genetic algorithm approach: generating new solutions and testing them. Testing algorithms is usually straightforward, as you know what they are to solve, so let's concentrate on the two ways of generating a new solution.

The first, and biologically most common is, of course, sex.

It is only the genetic theory of sex which is important here, not the rest of it. Sex takes the genes from two individuals and shuffles them to produce new combinations: you might have 'your mothers hair' (the genes which make your hair like your mother's) but your father's nose.

In a program, 'sex' takes part of one string and shuffles it together with part of another. The simplest way to do this is to take one end of one string and put it together with the other end of another. The 'ends' need not be halves. You could add 2/3 of one string to 3/4 of another, creating a longer string.

The other route is mutation. This takes a string and changes it a bit. Humans suffer mutation too but at a lower rate than we suffer sex. Mutation generates novelty in our genes, sex shuffles that novelty around in new combinations. Between them they are responsible for all the variation in living things, from aardvarks to zebras.

This is all easy to say but a bit hard to see how you would actually apply it. The problem is in evaluating the solutions you have chosen. Usually programs (what the computer does) and data (what it does it on) are kept separate, so manipulating programs as if they were data is difficult.

There is no particular reason for this, other than doing anything else makes for hopelessly unstructured and crash-prone programs. However, BBC Basic gets round this dichotomy in one respect with its EVAL funtion, so it is an ideal vehicle to demonstrate genetic algorithms.

You should use the EVAL function to show how to use genetic algorithms to solve the problem of fitting a curve to data points.

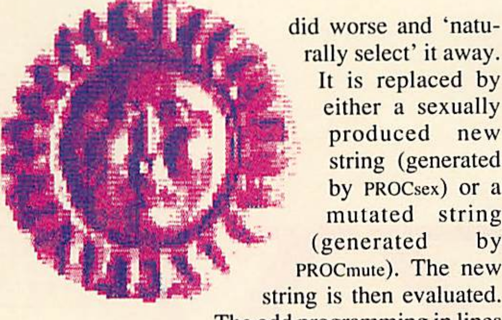
Curve fitting

Your program has a population of strings, pop$. These contain equations which do (or more likely, do not) fit some data you have typed in (and stored in 'answer'). To make things more interesting, this is a three-dimensional graph you are fitting – you type in x, y and z values and the program finds an equation in x and y to generate z.

To test if an equation actually does generate the right value, you only have to do z=EVAL(pop$(i). So you can forget about the evaluation side, and concentrate on sex.

The program is called *Gregor*, after Gregor Mendel. Calling it 'Darwin' would have been too obvious, and anyway dozens of people have beaten me to it.

Lines 1000-1300 set the program up. Lines 1310-1700 select the pop$ entry which



did worse and 'naturally select' it away. It is replaced by either a sexually produced new string (generated by PROCsex) or a mutated string (generated by PROCmute). The new string is then evaluated.

The odd programming in lines 1490-1580 is to avoid the problems that arise when your equation gives not merely a bad result but an impossible one (by, for example, dividing a number by zero).

When there is no difference between what the equation produces and what you typed in, then *Gregor* stops triumphant.

To make things easier, the program generates strings with the following syntax:

```
var (arith var)n.
```

where var is a variable (x,y or a number 1-9) and arith is an arithmetic operator (+ – */). Such strings are bound to be valid Basic expressions, so you avoid a lot of syntax errors. Describing the syntax you are going to allow is essential to get anything out of a genetic algorithm, or else nearly everything you produce is garbage.

So, to sex. PROCsex selects two strings, selects two arithmetic operators in them and adds the front end of one with the back end of the other so they join at the arithmetic operator. This preserves the syntax so (in theory) the string still 'works'. A few wrinkles are dealt with in sub-procedures.

Mutation is trickier, as there are many kinds of mutation. Either arithmetic operators or variables can be replaced by something else. Also, chunks can be deleted, and chunks of random rubbish added in. So, PROCmute has several subordinate sections, which are selected at random to give a range of mutations.

Again, you have to be sure to keep the syntax. This is not essential – if you get a syntax error, the string will cause an error and a very high 'score'.

But most possible strings will generate errors in EVAL, so to save time you do some pre-screening.

So how does it work? Try it out as it is, on some model problems such as x^2+y^2=z, z=3 and on randomly typed numbers, for example. Or try an 'impossible' problem, such as z=EXP(x)+EXP(y) (which would need an infinite series of +-*/ to solve). How well does it do?

```
1/9*7 => 235.333333
1/4*7 => 229.5
1/3 => 238
5+6 => 204
y/8 => 214.75
1/4+8 => 205.5
5-1*1 => 218
7/y => 236.964034
1/4/4+8 => 205.875
5-1*5+1 => 234
1/1 => 234
7/8 => 234.75
1*8 => 206
5+8 => 204
5+1*5+1 => 204
5+8 => 204
5+8 => 204
7/x/y/7+7 => 208.022687
1/7 => 239.142857
1/x => 239.110751

5+8 => 204
```

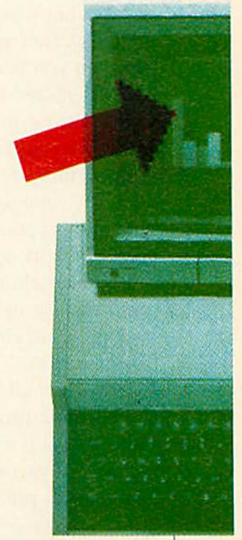
Gregor places the best-fitting equation at the bottom

You are probably getting a clue why the dinosaurs were around 100 million years before mammals were invented to replace them. Natural selection is certainly slow.

The program is actually not realistic in one respect. In real life, the worst surviving organism is not rigorously weeded out to be replaced by a better one. In real life, death comes to all organisms, soon or late, and even the best adapted can have a tree fall on them in a gale.

Indeed, it is not clear that we are any more successful than the dinosaurs. We just happened to evolve when a tree (or, more accurately, a 10 trillion tonne asteroid) wiped the dinosaurs out. To mimic this, replace lines 1300-1380 with lines which select a pop$ at random but are biased towards high-scoring (poorly adapted) strings.

The second program, *Gregor-Fix*, lists the replacement lines. Now even really rotten equations can survive for a while by chance. But the program does not fare much worse than in the original – indeed, sometimes it gets to a solution faster. This is because, although not much use in themselves, those 'rotten solutions' are the feedstock for future evolution – bear in mind that we did not evolve from bison or dinosaurs or other conspicuously successful species. We evolved from things that looked like thin, quill-less hedgehogs, and were so rare that any Cretaceous conservationist would have slapped a protection order on them at once.



The other thing you could do is alter the amount of sex going on. Altering 'sexprob' alters the ratio of calls to PROCmute and PROCsex. Setting sexprob to 1 means 50:50. As you increase 'sexprob' the equations get to look more and more similar.

We, of course (well, some of us) have sex much more frequently than we acquire mutations. This is why people look much more alike than your equations do.

Just leaving *Gregor* running will provide hours of harmless fun. Watch and marvel as it hunts fruitlessly for an equation to match some random numbers you typed in on the spur of the moment! Watch it generate an equation like:

```
z=x*x/x+7*y-y-y-y-y+x/y*y-6*y+x/2*4
```

when you typed in data to match

```
z=4x-3y
```

And consider that, fun though sex is, it is a good thing that most programmers stick to designing their programs properly.

GOING CRAZY

When it comes to flipping, rotating, reversing and otherwise messing around with the characters on your screen, **TIM CAMPEN** has the means and the end

Nobody would deny that the BBC micro and Master are capable of a great deal but when it comes to printing characters on the screen, their capabilities fade a little in the light of the Archimedes. Character font routines (such as the *Acorn User Calligraphy* program) go some way to rectify this but when it comes to manipulating the characters you already have, this is the program you need.

It all started with a short machine code utility sitting in page 9 which rotated selected characters. Unfortunately as I incorporated more features, the program which once sat snuggly in less than a page grew out of all proportion and started eating other people's work space!

I had no choice but to convert the program for use in sideways Ram, and so the back issues of *BBC Acorn User* were dusted off for action.

However, all was worth it, as the *Crazy Characters!* program which resulted provides model B and Master owners with star commands to rotate, enlarge, flip and fatten characters – plus a whole lot more.

Using the program

Once you have typed in and run the first listing from the yellow pages, you will be asked if the program is to run on a BBC Master. Simply answer Y or N to your configuration (explained later). If the checksum gives the all clear it will *SAVE the sideways image as CRAZYC. This is the sideways Rom image and should be loaded into a spare sideways Ram slot according to your particular sideways Ram user guide with *SRLOAD, *RLOAD or whatever.

If your sideways Ram has a write protect switch make sure it is not write protected as the utility uses the extra Ram to store data.

Press CTRL-BREAK and type *HELP. You should be greeted with *Crazy Characters!* and in brackets the version. If an 'M' is displayed, you are running under the Master version. A 'B' signifies it's configured for a model B. A demo program also appears on the yellow pages to put the system through its paces.

For writing your own programs, typing *HELP CRAZY produces a list of the *Crazy Characters!* star commands available.

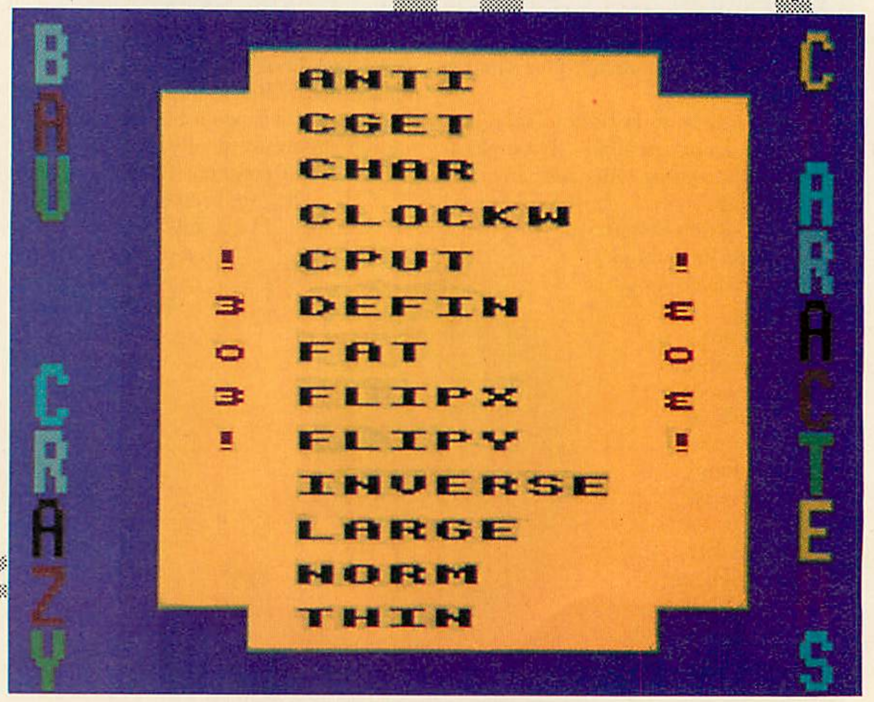
All these commands can be used from Basic or machine code programs for fast and effort-free character fun!

Commands

The first command that must be used when starting from scratch is *CHARxy. This informs the computer that only characters from x to y in alphanumeric order are to be altered by any of the *Crazy Characters!* commands (apart from *NORM).

The command *ANTI will rotate the characters 90 degrees anticlockwise. The utility does not poke the character workspace but goes the official route through VDU23 which should stop clashes with other software – which is what *Crazy Characters!* is all about. *CLOCKW performs the same trick but in a clockwise direction.

To flip the characters across the x-axis, use *FLIPX. *FLIPY does the same thing across



the y-axis. *FAT will broaden the characters and likewise *THIN makes them skinnier. *INVERSE will reverse the bits of the characters, producing a silhouette effect and *LARGEx ABC will print ABC, x characters high where x is a hexadecimal number.

For your own character definitions, *CPUT followed by a filename will save character definitions previously defined by *CHAR to tape/disc. *CGET followed by a filename will load a *Crazy Characters!* file and define the new definitions. *DEFINx will display the definitions of character x in hexadecimal notation.

Finally, *NORM resets all characters to their original definitions.

The program

The first 43 lines make up the standard header code needed for the operating system to recognise a sideways Ram program and handle the service calls.

Crazy Characters! assembles at &5B00 which would mean all the absolute addresses calculated would not sit inside the sideways Ram area. To combat this, every absolute address used has &2500 added on, held as the variable diff%.

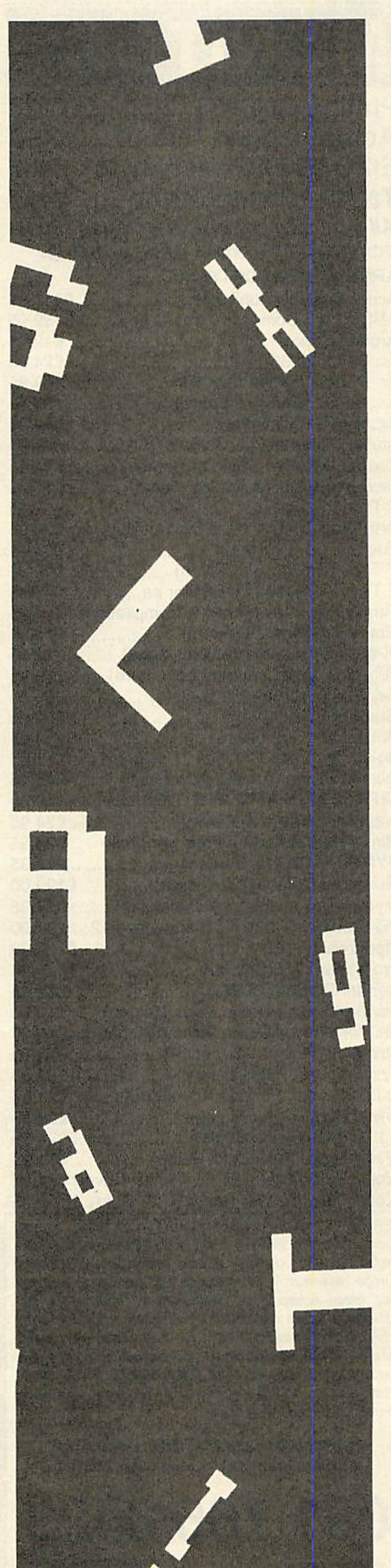
The first task for the serve routine is to preserve the accumulator, X and Y registers. The accumulator tells the computer what is requested and is stored at temp. There are over 20 different possible sources of a service call. The two that *Crazy Characters!* is interested in are service types 4 (unrecognised star command) and 9 (*HELP).

If the call is type 9, the computer branches to help (line 700) and if it is a 4, branches to unrec (line 1290). If neither are requested the accumulator, X and Y registers are reset to their original states and exits.

The help routine prints the title and version. The program scans the star command which is pointed to at location &F2-F3 plus the Y register. If any characters have an Ascii code of 91 or more, they are adjusted so that they fit in the band 65 to 90. When the computer finds the RETURN button was hit (line 920) it checks to see how many letters were typed. If four were typed in the user does not wish to have a list of commands and so just a short message is printed, the computer jumps back and exits.

If more characters follow, the computer checks the user's word against CRAZY. If they match the computer branches to explain and lists the additional text found at coded (line 4080).

Testing for the different star commands caused some problems, which accounts for the spagetti like programming. The problem is that more than one star command can have the same number of letters. Therefore I could not distinguish between them just by the number of characters. I finally solved the problem in the following way.



Location &72 and &80 flags are set to 0. If the first letter encountered matches any of the star commands it is checked for a RETURN. If it is not, &80 is kept at 0 and &72 is increased. If &72 equals 3 (four characters in length), chances are it is one of the *Crazy Characters!* commands. If the fourth letter matches any of the four letter commands, the computer branches to the relevant routine. If &72 equals 5, it could be a *LARGE or *DEFIN command so the computer jumps to another routine to find if it was either. Once it finds RETURN it branches to find.

Because the rest of the commands have differing numbers of characters, the x register merely has to be checked to find out which command was entered.

Routine char22 is called if *CHAR is entered. The two characters preceding the command are stored at charX and charY.

The *FAT and *THIN commands are executed from the same routine (font2). To distinguish between the two, the accumulator either holds a 1 (*FAT) or 0 (*THIN). To fatten the characters, each row is shifted one bit to the right and ORed (OR) onto its original position. This gives an effect similar to dragging the character, leaving a trail a short distance across the screen.

Instead of an ORA operation, an AND is used to make the characters skinnier. When looking at the character set you will find most of the vertical lines are two bits wide so after shifting the definition and ANDing onto the original character, all the vertical lines that were two bits wide are now one.

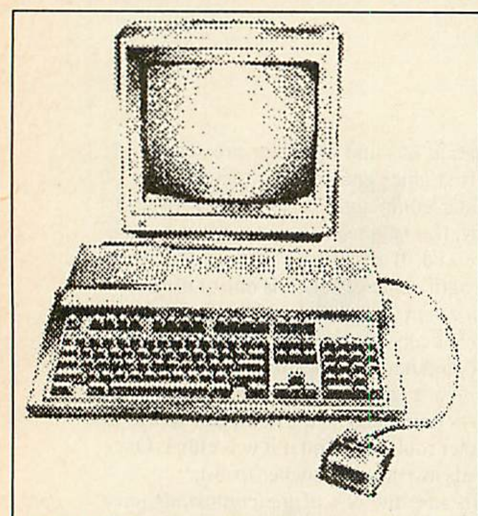
Because the only difference is the one instruction, the coding is cut down by poking the memory location where the operation is to take place. This is labelled convert. 61 is the code for OR A and 29 for AND. Once all eight rows have been altered, routine definition is called up – explained later.

*ANTI and *CLOCKW also use the same routine. Location &74 is poked with a 0 if *THIN is requested and a 1 for *CLOCKW. The rotation routine starts off by determining what the character definition is and then whether a clockwise or anticlockwise movement is wanted. Routine, an1 deals with the anticlockwise rotation. The important zero page locations are &73 for keeping a record of the column to be BITed, &76 for the row and &71 which keeps a running total of each column. Each column is BITed to test for a bit set (a 'lit' pixel). If one is found, location &71 adds the equivalent position going horizontally through addY.

Once all eight rows of the first column have been totalled, the result is stored along the top row of the character. The column to the left then follows through the same routine to be stored under the first row. Once all eight columns have been rotated, routine end is called to define the character. The computer then jumps to startA to rotate the next character.

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Master 128 .... £369
Master Colour Monitor £175
Eprom Cartridge £10.95
BBC Dust Covers £9.95

PORTABLE COMPUTING

Psion MC400 Mobile Computer £749
Psion Organiser LZ64 .... £159
Psion PC Comms Link £54
Z88 - 32k Portable Computer £195
Z88 - All-in-one Pack £239
Z88 - Arc Link £24.95
Z88 - A Dabhand Guide (Book) £14.95
Z88 - 128k RAM cartridge £41.26
Z88 - 32k EPROM cartridge £16.48
Z88 - BBC Link £20.61
Z88 - SpellMaster £56.95
Z88 - Mains Adaptor £8.65
All Psion/Z88 accessories and s/ware available

PRINTERS

9-PIN PRINTERS (free lead)

Citizen 120-D+ (Serial option add £20) £129
Citizen Swift 9 .... £199
Star LC10 B/W / Colour .... £159 / £189

24-PIN PRINTERS (free lead)

Panasonic KX-P1124 .... £249
Sheet Feeder for above £99
Citizen Swift 24 .... £269
Colour Kit for above (also Swift 9) £39
Star LC24-10 .... £219

COLOUR PRINTERS (free lead)

Integrex Colourjet 132 .... £509
HP Paintjet £795

LASER PRINTER (free lead)

HP Laserjet IIP Printer £995
Additional 1Mb RAM for IIP £199

NEW - ATARI LYNX - NEW

Atari Lynx £149
Electrocop £24
Blue Lightning £24
Chip's Challenge £24
Gates of Zendocon £24

The process for a clockwise movement runs along the same lines except that the columns running right to left are stored from the bottom upwards. Location &76 points to the current row which is copied across to the X-register for saving at cwsave.

Routine inv handles *INVERSE. 255 is Exclusive-ORed onto the character definitions within the loop, pop which cycles through eight times. This reverses the states of the bits within the definition. Once every character has been inversed, the end routine is called. The process then repeats until all the requested characters have been inversed.

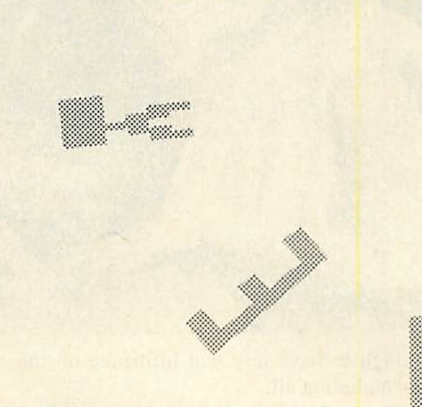
The routine flipX is responsible for flipping the characters across the x plane. The X register works from the top of each character down and meets half way with the Y register which works from the bottom upwards. Each time through loopxx, they swap the bytes between themselves by storing the X's information at the Y's position and the Y's information at the X's position!

*FLIPY is executed from routine flipYY. Loop flump governs this routine. Location &73 scans left to right on each row of the characters. At the same time location &80 travels in the reverse direction. Every time a bit is full, pointed to by location &80, location &71 is updated by the contents of &73. Therefore once the whole byte has been scanned, location &73 is arranged back to front to the original. After eight passes to read the bytes incremented by the Y register the new definition is defined. The computer then branches back into flump until all the requested characters have been flipped.

*NORM performs an FX20,fxcode. Originally, while writing solely on the Master, fxcode was zero. However, for use on a model B, if more than 32 characters are altered, corruption takes place, due to the 'high-water mark' as the *Advanced User Guide* states. &600 bytes must be preserved for the operating system. If *Crazy Characters!* is to run on a BBC model B and you want to alter all the characters, make sure PAGE is set &600 higher than normal before loading any Basic programs and bear this in mind when storing machine code. Master owners ignore this as all character definitions are accounted for in the private sideways workspace.

The key to the multi-height routine is how the eight rows of the characters are split up and printed on separate lines. The DIV operator is used to produce the row count. For example, to produce a character twice the normal size, each row of the original character definition must appear twice, and using DIV2 on a count produces 0,0,1,1,2,2,3,3... which are the numbers corresponding to the rows of the original character matrix. The larger the number used with DIV, the larger the height.

'All the hard work is done so all you need is a star command to drive those characters crazy!'



Once all rows of the character have been inspected, the equivalent amplified version is defined in character 240 to be printed.

The file routine determines whether a *CPUT or *CGET is requested. If *CPUT was issued, the computer jumps to save. The workspace to issue *SAVE is cleared to get rid of any rubbish left behind from a previous load/save. Routine findname is called which stores the filename in the reserved workspace. Since a block of sideways Ram within the range &8000 to &BFFF cannot be stored with *SAVE, the routines swapup and swapdown are used to transfer the character data between &26E0 and sideways Ram which is then *SAVED.

One final point, the *SAVE/LOAD command can be executed within sideways Ram on the Master but not on the Beeb. The whole saving command is also copied down into the main area.

*CGET (routine load2) is the same as *CPUT except a *LOAD command is issued with less parameters. The workspace is cleaned and main/sideways Ram is swapped.

The final command, *DEFIN is called up by routine foundef. The specified character has its definition called. Loop defKloop runs through eight times. An '&' is printed followed by the hex number of each row.

To get the hex number for each row, each byte of the definition in turn is stored on the stack. The four right-hand bits are wiped. The four left-most bits are shifted to the far right positions. If the number is greater than 9 it is adjusted by routine Hset before being printed. The old byte is then pulled back for the furthest four bits to be wiped and increased by 48, adjusted if need be, then printed.

At this stage *Crazy Characters!* is probably as clear as mud and if you want to make head or tail of it at all, keep on studying the source code.

CRAZY CHARACTERS!

The simple sideways Ram pathway to...
Rotate text anti-clockwise
Rotate text clockwise
Flip text across the x-plane LIKE THIS
Flip text across the y-plane
FATTEN, THIN, INVERSE
Find a definition:
A=&3C,&66,&66,&7E,&66,&66,&66,&00
AND {Save characters, eg *CPUT FRED
Load characters, eg *CGET JOHN
PLUS MULTI-HEIGHT *LARGE3 KATE}

PRIMARY OBJECTIVES

The National Curriculum for technology has at last been sent out to schools. **CHRIS DRAGE** asks how teachers, especially in the primary sector, will cope



This month we start with a joke: What's green and white and puts the wind up most teachers? Before you answer 'a poll tax demand notice, the correct answer is the technology National Curriculum. Yes, your school's copy probably fell through the letter box in late March and since then most of the staff will have been wondering how they're ever going to cope with it.

When questioned, it is inevitably attainment target 5 (IT capability) which worries them the most. This reaction is indicative of how IT has had to struggle along in schools since those heady days of 1982 when the DTI provided schools with the opportunity to purchase a heavily subsidised microcomputer.

Arguably, it is the primary sector which has struggled the most, with very little coming its way in the intervening years in terms of training or support.

So this month I want to air some of the issues regarding the delivery of AT 5 of the National Curriculum for technology in primary schools.

The first major issue concerns the training of teaching staff. The original condition connected with the DTI purchase was that two members of staff should receive training which would be passed on to the rest of the staff. This proved woefully inadequate.

One member of staff at my school returned from her two days 'hands-on' training totally mystified and negative about the whole experience.

How many colleagues have you heard grumbling that they've been on a two-day computer course and 'not got a lot out of it because they didn't start us off with the basics and that's what I wanted'?

Eight years on from 1982 and only a minority of primary teachers are confident enough to use computers as an integral part of their day-to-day teaching. In fact, recent studies have revealed that only a small number of teachers are using computers at all in primary schools (Research Project, Centre For Educational Studies, Kings College, London).

Many of the teachers who have attended short courses are only confident enough to operate the hardware and run a few familiar software packages. Frequently, teachers come away from such courses missing the essential element – how to integrate computers into their good classroom practice.

Assuming an IT-enthusiast returns to the school 'fired-up' and ready to put all the theory into practice, what does she or he find: the one and only machine is available just once or twice a week.

Inevitably, the impact of IT on the curriculum is very restricted. Time and time again it has been proven that using a computer for one or two sessions a week is not enough to have any real influence on the curriculum at all.

The technology National Curriculum contains five strands of IT capability:

1. Communicating information
2. Handling information
3. Designing, developing, exploring and evaluating models of real or imaginary situations
4. Measuring physical quantities and controlling movement
5. Making informed judgements about applications and the importance of IT and its effect on the quality of life

Nationally, the very first thing that must be done is to provide suitable INSET so that all teachers can gain the competence and consequently confidence to start integrating computers into classroom practice. This is essential because AT 5 does not suggest that IT should be taught as a separate subject but points out that it should be used across the curriculum to enhance learning wherever appropriate.

Reducing IT training to the 'twilight hours' (typically 4.30-6.00pm) would be both foolhardy and non-productive. Learning to use and apply IT effectively is not like participating in a workshop session, it is still a new area for many teachers and therefore requires particularly fresh and receptive minds. The programmes of study in the technology National Curriculum emphasise a developmental process.

The foundations of both information handling and wordprocessing, for example, are laid down from the earliest years and are built upon in succeeding years. The kinds of computer use described are the most difficult for teachers to master and will require extensive training.

At key stage 1 (levels 1 to 3) five to seven-year-olds should be taught: '...how to give instructions to electronic devices such as programmable toys and computers. ...how to store, select and analyse information using software, for example a simple database. ...how to organise and present ideas using software, eg a wordprocessor.'

Few infant teachers, as yet, will be that conversant with wordprocessing, data handling software or programming in Logo to confidently integrate these aspects of IT into their everyday classroom practice.

In addition to AT 5, explicit statements relating to computer use appear throughout the core subjects of the National Curriculum. However, there's more to it than that,

for throughout the statutory statements, there are specific implications that a computer must be employed.

Logo in the maths curriculum is one example, wordprocessing in science is another. The overall implementation of IT is really broader than is at first apparent.

If there is one thing that is guaranteed to put any teacher off using computers in his or her teaching is when, after all the preparation, a system failure renders the computer or a peripheral, useless. Frequently, the teacher has neither time nor expertise to put the problem right.

The first person called upon (when time permits) is the IT co-ordinator who also has a full teaching commitment and little time other than a lunch hour or after school in which to troubleshoot the problem. By this time it's too late. Unlike their secondary colleagues, primary teachers have little non-contact time, hence there is no one to call for assistance when things go wrong.

Obviously, with proper training and IT familiarisation many of the operator-related 'problems' could be eliminated. However, all schools need an infrastructure for proper technical backup. Replacing aging machines with the latest, reliable technology would also help solve this.

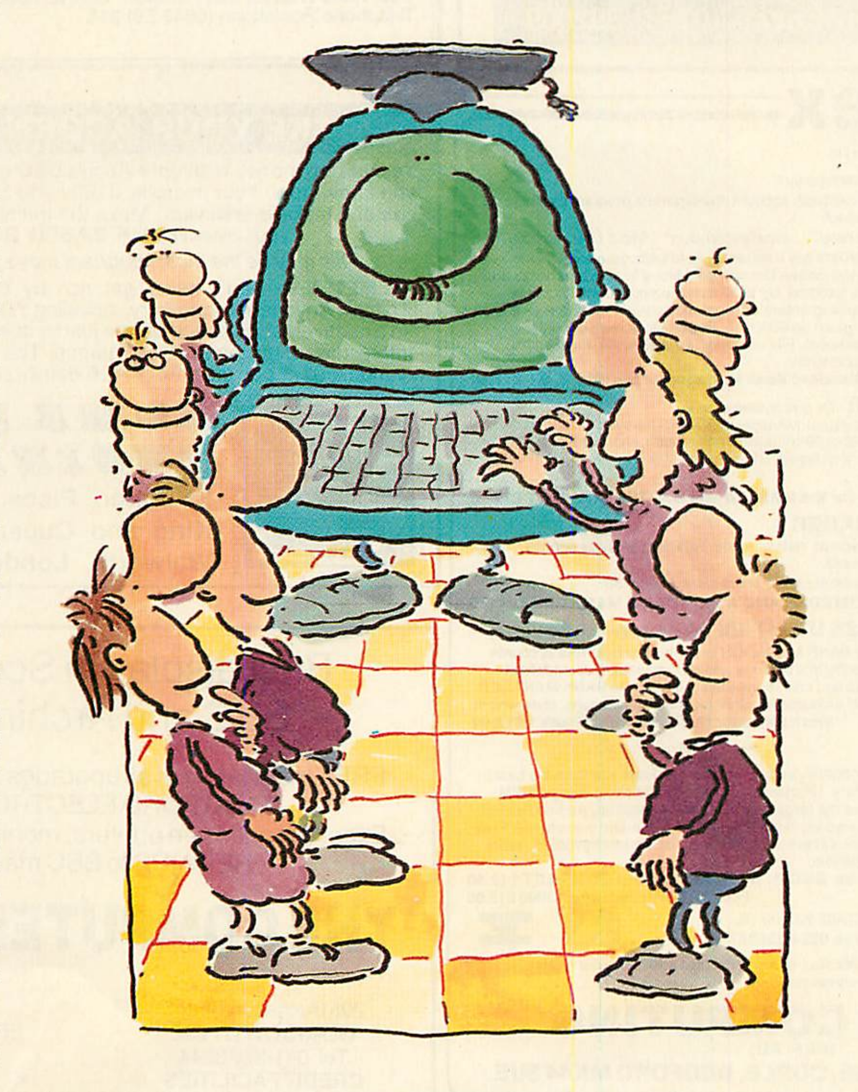
The second major issue concerns resourcing. The fact is that most primary schools do not even yet have a micro in every classroom. Many others share one machine between two classes and there are schools still with their single DTI subsidised computer.

It doesn't take a mathematical genius to work out that given one computer per class of 30 pupils, over a typical school year of 40 weeks of 25 teaching/learning hours there isn't going to be much more than 25 to 30 hours hands-on experience per pupil; even less when you consider the time demands made by other areas of the curriculum (daily assemblies etc). Is 30 hours a year really enough?

Some computer-based activities are very time-consuming. In my class of eight-year-olds, for instance, it is common for one or two children to take the best part of a morning to complete a piece of Logo wizardry or to type their story collaboratively on the wordprocessor. If their time is rationed, their motivation and enthusiasm for the task is soon lost.

And what about even more time-consuming, yet equally valuable, computer activities like simulations and adventure software? They are mentioned in AT 5 at level 4 and can provide a suitable focus for a whole class for several weeks on end. If wordprocessing and data interrogation are also to take place concurrently, as they probably should, one computer per class becomes a joke.

Now don't get me wrong, I am all for the technology National Curriculum orders concerning IT capability. At last IT has been elevated in status to a level where it will play a vital role in the overall curriculum. However, it is important that this recognition is backed up with proper INSET (teacher training/retraining initiatives) and the necessary hardware and software funding to prevent teachers being thrust even deeper into the slough of despond with IT becoming the straw that breaks the metaphorical camel's back.



One solution might be to 'phase in' the technology National Curriculum over a period of three to four years during which time funding could be made available for teachers to attend substantial curriculum-based courses in IT.

In addition, there could be on-going, school based INSET on matters like policy-into-practice and assessment with the provision of supply cover while teachers attend such courses.

With regard to hardware, the aim should be to place at least five modern microcomputers in every classroom in the country, with the installation of suitable security systems and the provision of technical backup.

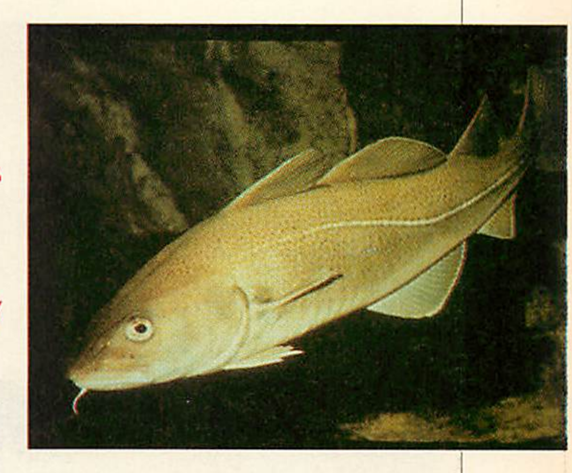
Software tools will be all important. At present it appears that schools will continue to do what they have always done: run jumble sales and the like in order to fund software. With the new demands made upon them by the technology National Curriculum schools must get some form of annual funding for buying software.

The result would be twofold: as schools could then pay realistic prices, it would encourage and foster educational software development (for which this country is envied throughout the world) and schools would also be willing and able to invest in innovative software.

Idealistic? Maybe! The scrapping of a Trident missile or two may release the odd penny which could be directed towards the proper implementation of IT in our schools (when was the last time you heard of the army having to run a summer fete to purchase a new tank?).

The simple fact is that if the primary sector is not properly trained and resourced, the innovative and comprehensive technology National Curriculum will collapse in its infancy.

EIGHT BITS SPECIAL



This month's bonus is a bumper bundle of useful hints and tips for 8-bitters, with extra yellow pages

ANIMAL CRACKERS

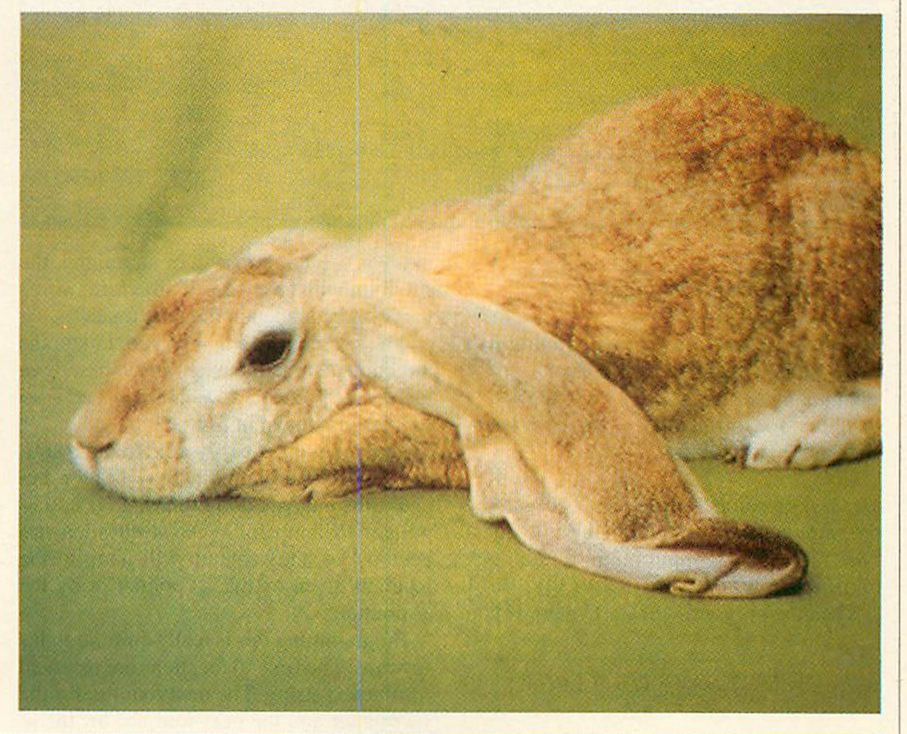
This is a tree-type database program (listings 5 and 6). By using the indirection operators, this type of database is quite easy to program.

The program could have been written in a number of ways, using arrays for instance. A tree-structured database has a structure like figure 1.

These programs can be made to learn as they go along. If the program reaches the end of the tree, and the correct animal is not found, it will ask what the animal was. A new question then has to be entered and this is added into the structure, so that the tree grows.

Listing 5 is a tree program for animals. It could easily be adapted for a variety of tasks. A sample text print out would be:

Are you thinking of an animal?
Yes
Does it have four legs?
No
Is it a sparrow?



DESCRIPTION OF LISTING 6

Line 70 The initialisation procedure.
Line 80 The procedure to load a file.
Line 90 The main procedure.
Line 100 The procedure to save the tree.
Lines 140-150 S% is the start of the memory location. E% gives the end point in the memory. Initially this is set to four locations further on from the start point. This then allows space for this pointer value to be added at the start of the file when saving to disc. a% allows space for a text file of 39 characters plus a Return code. b% allows space for the text file and the first pointer. c% is the total length for a single entry.
Lines 160-210 Data to start the tree. The text in these lines can be changed to suit your particular application.
Line 250 P% is the pointer to the memory location of the current record.
Line 260 Clear any text windows and clear the screen.
Lines 270-280 Print the title in double height. Electron owners should not enter line 280, and should omit the CHR$141.
Line 290 Set a text window on the screen so that the title is not scrolled.
Line 300 The question to start the tree off. Again the text here can be changed to suit your own application.
Line 310 The question which will only accept a Y or a N as an input.
Line 320 Answering N here will end the program after saving the current tree file.
Line 330 The yes pointer will be zero if the text contains an object rather than a question. Therefore if an object is recognised, the words 'is it' are printed out.
Line 340 Print the object or the question.
Lines 360-370 If an object than either the computer wins or a new object can be added to the tree.
Lines 380-390 If a question then jump to the next branch in the tree.
Lines 430-460 Wait until the Y key or the N key is pressed, then print either Yes or No.
Lines 500-570 Input a new object and a new question. Checks are made to ensure that the length of the text is within the allowed length. Line 560 is necessary to ensure that the question is related to the correct object.
Lines 580-630 Put the new question and object into the tree and set the yes pointer and the no pointer.
Lines 670-720 Ask if there is a tree to load. If yes, load the file 'TREE' into the memory area reserved for the tree. Save the memory area of the tree. It is always saved under the filename 'TREE'.



No
What are you thinking of?
A duck
Tell me a question that will distinguish between a sparrow and a duck
Can it swim?
What would the answer be for a sparrow?
No

The last question is necessary because the program needs to know whether the question that has been input refers to the duck or the sparrow.

Then the program will start again. If you say you are not thinking of an animal, the program will save the tree structure, which can then be loaded in the next time.

The program has a very simple storage structure. Basically each entry has three elements. The text, a 'yes pointer' and a 'no pointer' as shown in figure 2 .

The program is easily able to differentiate between an animal and a question because the animals do not have a yes or a no pointer to jump to. When a question has been asked, the program will jump to the location given by the yes pointer or by the no pointer.

Programming this is really quite straightforward. The first 40 locations are reserved for the text string. The next four are for the yes pointer and the next four are for the no pointer. E% gives the current end of memory position. a% gives the offset to the yes pointer, b% gives the offset to the no pointer, and c% gives the offset to the new end of the file. Thus to add a new animal the following structure is used:

```
$E%="A DOG" Put text into memory.
E%!a%=0     Put 0 into yes pointer
E%!b%=0     Put 0 into no pointer
E%=E%+c%    Move end of file pointer
```

Listing 6 is the essential add-on to the tree program, a method of editing the text in the tree structure. It is a very useful extension.

DOES IT HAVE FOUR LEGS?
YES — NO
IS IT A REPTILE? — IS IT A BIRD?
YES NO — YES NO

Fig 1. The database has a tree structure

Location	Text	Yes PTR	No PTR
3000	Does it have four legs	3030	3060
3030	A Dog	0	0
3060	Can it swim	3090	30C0
3090	A sparrow	0	0
30C0	A duck	0	0
30F0			

Fig 2. How Animals stores text

WRITE TO THE EDITOR

Listing 1 is a disc sector editor and will display the contents of a single disc sector on the screen. Any sector can be selected, as can different drives. A printout option is also included.

It is possible to scan a sector, pause, then read the next sector, then the next, and so on. The sequence can be stopped at any time by pressing the space bar. These various options are selected by using the function keys.

All the information stored on the disc (or in the computer's memory) is in a coded form. Each sector will store 256 bytes of information, where each byte is a number in the range 0-255.

Sometimes this number is the Ascii code for a text character, sometimes it is the token for a Basic keyword. So it is useful to not only display the actual number but also, where possible, the Ascii character.

In order to get all the characters on the screen at once it is necessary to use an 80-column display (mode 0). This means that the program has to be kept quite short because memory space on a BBC B is at a premium.

For this reason, meaningful variable names have not generally been used. The main variables are:

```
C%: sector character
D%: drive number
G%: keyboard input ASCII code
M%: display type, ASCII or hex
S%: sector number
T%: track number
t%: number of tracks on disc
x%: horizontal screen position
y%: vertical screen position
p%: parameter block for sector read/
    write data: memory page where
    sector values will be put.
```

PROCinit sets all the variables and defines the function keys. It also defines the screen colours.

These are set to blue and cyan here, but any other colour combination can be used. (This is quite critical as in mode 0 some monitors give much better results with certain colours than others). Because of the shortage of memory, some memory blocks are given actual memory locations, so if you wish to use this with the second processor, you will have to dimension the memory blocks by using DIM.

PROCrun is the main run loop of the program. PROCscreen draws the screen display, making use of a double-height, double-width routine originally given in Hints & Tips, *AU* November 1985.

Although only two colours can be used on the screen at any one time, different effects can be obtained by the use of inverse print.

PROCdisplay prints out the contents of a sector in both hexadecimal format and in Ascii characters. PROCtype looks at the locations in memory where the contents of the disc sector were put and prints these on the screen.

The parameter box determines which of the two boxes the information is put into. Box 0 is the hexadecimal display, and box

1 is the Ascii display. Selecting box=2 will enable both boxes to be updated.

What happens to those numbers which are not directly convertible to Ascii codes? Numbers below 32, if converted to Ascii codes, can have an effect on the screen display so these must be filtered out. Codes above 126 cannot be converted to Ascii codes so these too have to be filtered out. Usually in such programs those codes outside the Ascii code range 32-126 are replaced by full stops, but this tends to be confusing, so instead rectangular blocks are displayed here.

These are held in user-defined characters 128 and 129. Code 128 is a hollow block, and 129 is a solid block.

PROCinput is the routine to input a character from the keyboard, or to select one of the function key inputs. Once a character has been input which is not one of the function keys, PROCupdate will alter the value on the screen and in memory. If the cursor is in the hexadecimal display, two digits must be entered.

PROCprint is the procedure to give a hard copy of the display. To be as compatible with as many printers as possible, and to work speedily, this is not an actual screen dump, but a simple text print. A hard copy is often useful when you experiment with a sector and you might want to return it to its previous state.

PROCdouble and PROCmc form a double-height, double-width print routine. The assembly code routine is compressed to save some memory space.

PROCrdsec is the heart of the program – it reads a sector of memory into a memory block in the computer. It uses the OSWORD call which requires a parameter block of information to be given first:

```
Byte 1: drive
Bytes 2-6: address
Bytes 7: number of parameters
Byte 8: set to read
Byte 9: track number
Byte 10: sector number
Byte 11: read one sector
```


How data is held on BBC discs

Once the OSWORD call has been made, errors found will be reported in the following byte. Normally the DFS translates these to the error messages you have learned to fear. With the sector editor, these are simply reported as 'Disc read error'.

Similarly PROCwrsec reads a sector from the disc and stores it in the memory block pointed to by data.

PROCdr, PROCsec and PROCtk are the input routines for the drive, sector and track. PROCtkno is the procedure to find how many sectors are on the disc.

It can cause damage to the disc drive if it is made to look for more tracks than the drive is capable of accessing.

There is no way of determining this from the hardware, so you have to rely on the value stored on the disc. PROCscan is the routine to start the program scanning through the sectors.

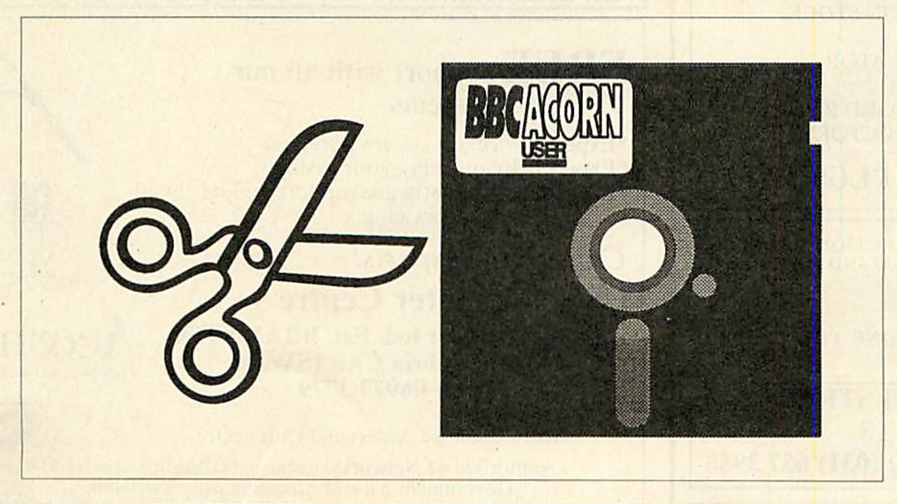
POLAR GRAPHICS

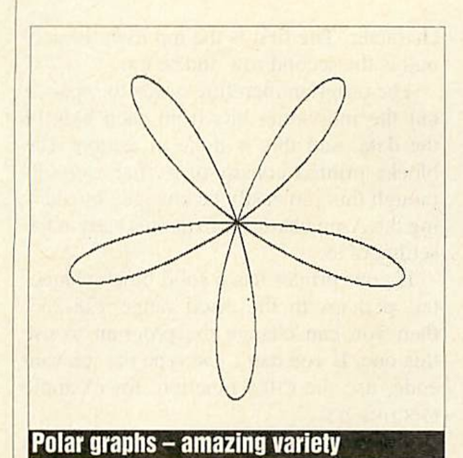
Listing 2 is a short program to produce an amazing variety of polar graphs. Polar co-ordinates are a different way of locating points on a surface.

Positions are given as the angle and distance from the 'pole'. In the program, the variable z contains the angle which loops from 0 to 2*PI (line 450) and r is the distance. This is set according to the equation chosen (line 460).

To plot the graph of a polar function, the polar co-ordinates must be converted to conventional 'Cartesian' or (x,y) co-ordinates as these are used by Basic's MOVE, DRAW and PLOT commands. This is done using the trigonometrical functions sine and cosine (SIN and COS). PROCinitialise ensures that graphs plotted at the right size to fit comfortably on the screen.

The program has seven pre-defined equations and there are two variables (A and B)




Polar graphs – amazing variety

which can be entered and are best in the range 1 to 10. You can also experiment with different equations by altering FNequation and PROCinput. For a rolling demonstration of possible polar graphs, enter and run listing 3.

PRINTING IN A SPIN

Listing 4 is a routine to print text vertically in any screen mode (except 7 of course!). This is often useful when labelling graphs and so on. After assembling the code, the method of use is:

```
PRINT TAB(X,Y);
*LINE Any old text...
```

Note the semicolon after the brackets. The text following the *LINE will appear at the screen position (X,Y). The program works by assembling a piece of code at &900 and changing the user vector at &200 to point to this code.

HORIZONTAL TEXT IS BORING!! USE-



A checksum routine is included to report any typing errors and a short demonstration is also given.To print text the opposite way, change the following lines:

```
540 LDA &80,Y:ROR A
560 LDA &88,X:ROR A
800 LDA #10:JSR wrch
```

ROL shifts each bit one place to the left, ROR shifts each bit one place to the right and this reverses the letter.

So the text moves down the screen rather than across, Ascii code 10 is used instead of Ascii code 11.

SCREEN DUMPS

Often it is useful to produce a printed copy of the current screen. Listing 7 is a screen dump tailored for screen modes 1, 2, 4 and 5. Listing 8 is a mode 0 dump. Both are designed for use with 8-pin printers. To use one of the machine code dumps in your own programs, type in the listing and save. Run the program. When it is finished, type:

```
*SAVE SDUMP 900 +FF
```

The machine code part will be saved in a file called SDUMP. To use this in your own programs, you can include a line like this:

```
50 *LOAD SDUMP
```

and then:

```
100 CALL &900
```

when the screen dump is required. Obviously this line should be inserted at the point in the program when the drawing is complete. You can use:

```
100 *SDUMP
```

as an alternative, as this both loads and runs the machine code.

The problems with listings 7 and 8, and most other screen dumps, is that the vertical and horizontal scales are different. What appears as a circle on screen is printed as an oval on paper.

Proportional screen dumps print with the same vertical and horizontal scale, so circles are truly round. This sort of facility is absolutely vital for any drawing or painting program.

As they stand, listings 7 and 8 do not produce round circles. The reason for this is that printers print with a vertical spacing of 72 dots to the inch. Thus the circles appear as ellipses.

Newer printers include another graphics command. This is the ESC * code, which will allow several graphics variations. Epson 8-pin printers have seven variations; some printers, the Citizen 120D included, have eight.

This code, with a parameter of five, allows graphics with 72 dots to the inch to be produced, thereby offering true circles. The changes to be made to listing 7 are:

```
380 LDA #27:JSR printer:LDA #42:JSR
printer:LDA #5:JSR printer
```

Do note that this latter option will not work on some printers – check your manual to make sure.

Listing 9 is a useful variation on listing 8. By printing the screen sideways, it gives a full-screen proportional screendump. This dump uses the ESC * graphics print mode of a printer with the mode set to 5.

Many printers will only fit this way round, as the dot column width of most printers in proportional mode is 576 dots, and the screen dots are 640 wide by 512 up. The normal printer graphics mode (ESC K) will only print 480 dots wide, so this will not work at all.

One other point on screen dumps. The graphics origin must be set at 0,0 to produce a full screen graphics dump. Otherwise the dump will include areas that are off the screen. These areas will be printed in black.

PART SCREEN DUMPS

Listing 10 is a screen dump that will dump just part of a screen. The dump requires four numbers to be stored in memory before it will work.

These are the screen co-ordinates of the bottom left and the top right-hand corners of the screen area to be printed. They are stored in memory locations &80 to &87 in the following way:

```
!&80=xmin:!&82=ymin
!&84=xmax:!&86=ymax
```

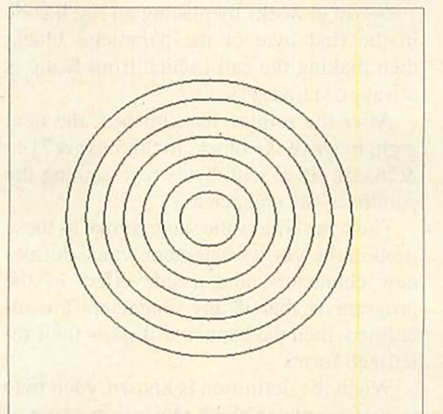
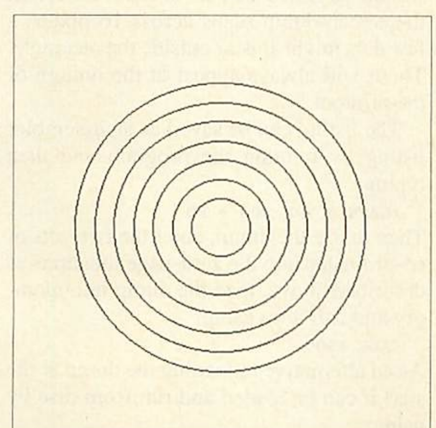
The ! indirection operator is normally used to store a four-byte number, storing the lowest byte first. Storing the hexadecimal number &12345678 using the ! operator by entering:

```
!&80=&12345678
```

would put

```
&78 in location &80
&56 in location &81
&34 in location &82
&12 in location &83
```

The screen co-ordinates are each given as a two-byte number. Putting the next screen co-ordinate into a memory location two



A normal screen dump (left) shows elliptical distortion. Right – a proportional dump

bytes further on overwrites two zeros, which are not required.

This is a much neater way than having to split up each co-ordinate into the low-byte number and the high-byte number:

```
?&80=xmin MOD 256
?&81=xmin DIV 256
```

There are important differences between listing 10 and the full screen dumps (listings 7 and 8). It is not assumed the dump starts at co-ordinates (0,0) but instead minimum x and y co-ordinates are specified. This is dealt with at start for the x co-ordinate, and at newline for the y co-ordinate.

The number of graphics characters sent to the printer on each line also has to be changed.

This is sent to the printer each time a new line is started, and forms part of the 27,42,n1,n2 printer command at newline where n1 and n2 form a two-byte number giving the information to be sent. (See Hints & Tips in the September 1986 issue for a fuller description.)

The number of dots to be sent will be the height of the required screen dump divided by two (because the dump prints sideways). Finally, there is a test to stop the x co-ordinate stored at location &84 and &85. This is done at checkend.

Listing 10 draws a set of random triangles in black on a white background. Then a red rectangle is drawn, and the area inside the rectangle is dumped to a printer. The rectangle is only drawn for the purpose of the demonstration and serves no useful part in the program.

The size of the dumped area can be changed to suit a particular application. It should be noted that as in the x direction the screen dump scans across 16 pixels, a few dots might appear outside the rectangle. These will always appear at the bottom of the printout.

The listing can be saved as an assembler listing by running the program and then typing:

```
*SAVE PDUMP 900 + F0
```

Then to use the dump, enter the two sets of co-ordinates into the zero-page locations as described above, load the dump into memory and call it up using:

```
CALL &900
```

As an alternative to loading the dump at the start it can be loaded and run from disc by using:

```
*LOAD PDUMP
```

Do note there are no checks in the assembler listing to ensure that the co-ordinates given are sensible.

Therefore, if such a routine is included in a program, then you should ensure that each co-ordinate is in the range of the screen graphics area and that maximum points are greater than minimum points.

BANNER PRINTING

Here's a banner program which will print out a message in giant letters on almost any printer which accepts continuous paper.

BANNER!

There's no need for the printer to be Epson compatible, so long as the printing is done using text only.

The program, listing 11 on the yellow pages, is fairly short and neat. It works by taking a string, one character at a time. It reads the definition of the character with Osword 10, a call to an operating system which uses a parameter block (an area of memory), to store its results.

All Osword calls work by setting the X and Y registers to the address of the parameter block. Addresses on the Beeb consist of two bytes, and the X register is set to the low byte, and Y to the high byte. In Kieran's program he has used location &70 for the block. So X is &70 and Y is zero. You don't have to use a zero page location, but this is a good place as it's a memory area not used by Basic.

Note that in the program, the Osword call assigns Basic variables X% and Y%. Doing this before a CALL on USR statement sets up the values of the X and Y registers immediately before the machine code call is made.

Osword 10 works by placing an Ascii code in the first byte of the parameter block, then making the call (which from Basic is always CALL &FFF1).

After the routine has finished, the next eight bytes of the block, in this case &71 to &78, are filled with bytes representing the pattern of the character.

The bytes follow the same format as those used in the VDU 23 statement which defines new characters, and a side effect of the program is that if any characters are redefined, then the banner will show their redefined forms.

When the definition is known, each byte in the parameter block represents a row of eight pixels making up the shape of the character. The first is the top row, the second is the second row and so on.

The program therefore needs to separate out the individual bits from each byte of the data, and this is done in a loop. The blocks printed consist of # characters although this can easily be changed by altering the Ascii character in quotes used in the setting of b$.

If your printer has a solid block character, perhaps in the Ascii range 128-255, then you can change the program to use this one. If you can't just type the relevant code, use the CHR$ function, for example b$=CHR$(255).

The program allows for magnification from 1 by 1 to 9, and the vertical and horizontal magnification may be different. Kieran found that 3 by 6 or 4 by 8 gives the best results.

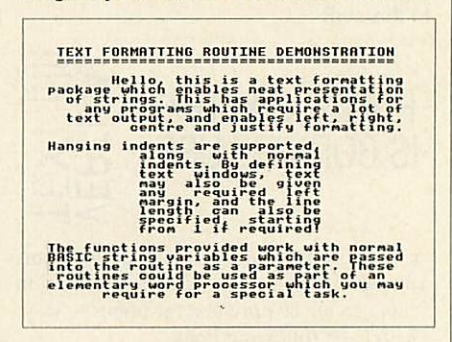
To use the program, switch your printer on and follow the prompts, giving the text string, followed by the magnification. Printing will then commence.

You might like to improve the print quality by inserting the relevant codes for bold type, and so on, immediately after the line starting DEF PROCsideprt.

TEXT FORMATTING ROUTINES

Programs which print a lot of text on the screen can be enhanced by the text formatting procedure given in listing 12 on the yellow pages.

Wordprocessors normally offer four options for text display: left-ranged, right-ranged, justified and centred. PROCformat



provides the same facilities, taking a line of text up to 255 characters long and output it as a paragraph in the desired way.

PROCformat takes four parameters – the indent (positive or negative), line length, target string and style – 'RIGHT', 'CENTRE' or 'JUSTIFY'. Anything else is treated as ordinary left justification. Listing 12 includes a short demonstration of the possibilities.

The indent can be negative for a hanging indent or 0 for none and the line length must not exceed the width of the screen. The string to be printed should not contain RETURNS or control characters.

PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

What is a Real Time Video Digitiser? There are quite a few different 'Digitisers' available for the Archimedes but very few can accurately claim to fit the above description. The requirements are that it must be able to 'grab' a single field of video information from a colour moving source, such as a video recorder, TV, or video camera, and then process the image and display it on the computer screen.

The Pineapple Digitiser does just this, – and at a price which is less than some Digitisers which can only handle static images.

HARDWARE

The hardware consists of a double width podule which fits inside a 300 or 400 series Archimedes, and comprises a PAL colour decoder, 256K memory and various control and interface circuitry. The PAL decoder converts the input signal from your TV or video recorder into separate red, green and blue signals. These are then converted into digital form and stored in the 256K ram in a format giving 512 pixels across the picture and 256 rows vertically. The video signal in the ram is constantly changing at the same rate as the incoming video picture until the podule receives a signal from the computer to 'freeze'. At this point the last picture in the ram is frozen and can be transferred to the computer screen in many different ways depending on which software commands are issued.

SOFTWARE

The software to drive the podule is supplied on disc in the form of a relocatable module. This provides a host of additional '*' commands and SWI's which can be used even by inexperienced programmers to produce very impressive displays of live pictures or ones previously saved on disc. For non-programmers, ready written programs are provided to explore all the features of the Digitiser and produce 'Sprite' images which can be used in many other applications and 'Art' packages. The software is very easy to use and scaling routines are provided which allow you to manipulate the grabbed image by selecting any part of the picture (using a box drawn on screen controlled by the mouse) and placing it on any area of the screen, again using a box to select the position and size. This enables multi-picture images to be produced very rapidly using either live pictures or ones you have previously saved on disc. The 80 page handbook provides full details of how to implement the commands even for the inexperienced programmer.

EDUCATION

The Digitiser has many uses in education. The software commands can show many of the effects typical of the digital storage of TV pictures which can help to explain the way in which TV works. It can also be used to produce powerful audio-visual displays tailored to your own requirements from images captured using video cameras etc. For younger children, programs can be created to help learning by giving high quality visual images of animals, birds, trees etc, built into a 'quiz' format. The possibilities here are endless.

FUN & GAMES

As well as showing off to all your friends who don't have an Archimedes, what a great computer it is, you can use the Digitiser to produce images for all sorts of games and visual demonstrations. Games such as 'Guess the Celebrity' or 'Guess the Advert' can be produced by even inexperienced programmers, simply by 'grabbing' all the necessary images from TV and saving to disc.

SPECIFICATION

Video Inputs	Pal coded video, .75 Volts – 2·5 Volts pk to pk R, G, B & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192KRam Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256K Ram
Picture Area	The Digitiser harware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.

QUESTIONS & ANSWERS

Q – What is the difference between the 12 bit and 16 bit version?

A – The 12 bit version can produce very high quality pictures, those shown on this page were produced that way, but 16 bits can give even better results particularly in high resolution screen modes.

Q – Why have an R, G, B input?

A – For those who have professional video cameras capable of producing R, G, B outputs, the R, G, B inputs can give significantly better results than the PAL inputs by avoiding the coding-decoding process. This removes some of the defects of the PAL system such as cross-colour, and also reduces noise'

Q – Is a moving picture available?

A – Yes, you can show a real live moving TV picture on the computer screen. This means that if you are using a video camera or recorder as an input source then you don't need a separate monitor to frame up the picture.

Q –Will it work on the A3000?

A – Yes, we can provide an inexpensive adaptor box which will enable the digitiser to work on the A3000 computer.

Q –Are the controls difficult to set up?

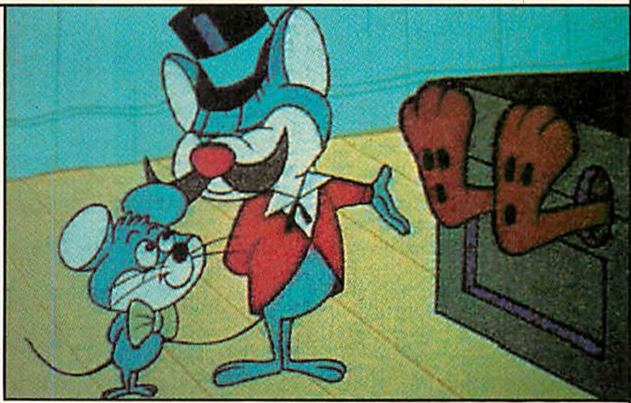
A –No, the three controls are exactly the same as on a normal TV set, Brightness, Contrast and Colour (Saturation). They may appear difficult to get at as they are at the back of the computer, but once set to your preference the brightness and colour should not require further adjustment, and the contrast (which is the easiest to get at) will only need adjusting if the video input source is changed.

Q –Does it take a long time to Digitise a full screen colour image?

A –Not really, a full screen image takes just 6 seconds on a standard 310, and reduced size images take proportionately shorter times.

Q –What software commands are built into the module?

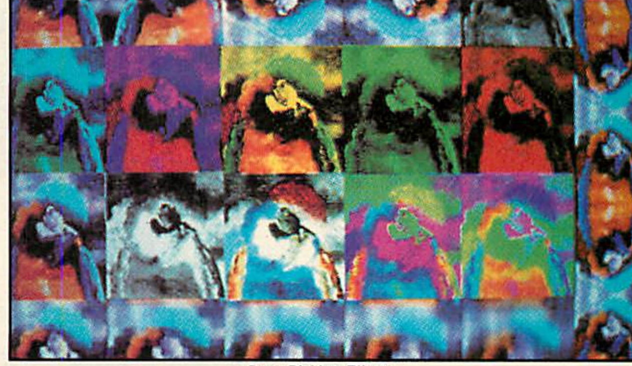
A –The software is under continual development and updates will be made available under our usual updating schemes (i.e) most updates are free), but the currently available commands are :– Average, Bits, Default, Digitise, Flip, Focus, Freeze, Image, Loadscreen, Loadsprite, Loadvideo, Mono, Moving, Negative, Noise, Outline, Palette, Primary, Restorescreen, SaveAIM, Savescreen, Savesprite, Savevideo, Screenarea, Setvideo, Unfreeze, Videoarea.



Cartoon



A Multi Picture Image



Some Digitiser Effects

– 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' –

– 'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes' –

Acorn User – April 90

Prices

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BBC PCB Designer

This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input rountine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

The full auto-route facilities are available even on a standard unexpanded model 'B'.

'PCB Autoroute is remarkable. No similar software comes near the price.'
ACORN USER Aug 88

PRICE		
	Manual track routing	£85.00
	Auto track routing	£185.00
	Plotter Driver	£35.00
		P&P Free

Still available at new discounted price! DIAGRAM II £25.00 !!!

ADFS Utilities Rom

ADU is an invaluable utility for all ADFS users. It adds over 22 new * commands to the ADFS filing system as well as providing an extensive menu facility with over 35 sub commands covering such areas as repearted disc compaction, saving and loading Rom images, auto booting of files, and many more. Transferring of files from DFS to ADFS is also made very easy.

ADU ....£29.00 P&P free

Marconi Tracker Balls

RB2/101	Bare for BBC	£49.83
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COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow Ram	Monthly Disc
Music	30											
Listing 1(1)		■	■	■	■	■			■	■	■	■
Risc Revue	30											
Listing 1-3							■		■	■	■	■
Genetics	64											
Listings 1-2		■	■	■	■	■	■	■	■	■	■	■
Image Analysis	68											
Listings 1-2		■	■	■	■	■	■	■	■	■	■	■
Windows	71											
Listing 1-3				■	■			■	■	■	■	■
Crazy Characters	74											
Listings 1-2(2)		■	■	■	■			■	■	■	■	■
Classic Eight Bits	81											
Listings 1-13		■	■	■	■			■	■	■	■	■

Note: (1) requires Ample (2) requires sideways Ram

MUSIC

Listing 1

```
"RUN" []   "electom" []  "fullreed" []
"guit" []  "maracca" []  "mix" []
"mix1" []  "mix2" []     "part1a" []
"part1b" [] "part1c" []  "part1d" []
"part2a" [] "part2b" []  "part2c" []
"part2d" [] "part3a" []  "part3b" []
"part3c" [] "part3d" []  "part4a" []
"part4b" [] "part4c" []  "part4d" []
"part5a" [] "part5b" []  "part5c" []
"part5d" [] "part5f" []  "part6a" []
"part6b" [] "part6c" []  "part6d" []
"pufflute" []  "rhyt" [] "snare" []
 "title" []    "x" []    "z" []

"RUN" [title   "123456-d1a2b1ac"PLAY
]

"electom" [2 CHANS
1 CHAN
 Metal      Flat      Click
  255 FM  -2Ø PITCH   OFF PSENS
2 CHAN
 Pure       Drop      Short
 -112 SHIFT          128 AMP
EVERY CHAN
   ON PHSET
]

"fullreed" [2 CHANS
1 CHAN
 Hollow      Flat         Soft
  45Ø SHIFT   ON SYNC
2 CHAN
 Hollow      Delvib       Soft
 128 AMP
EVERY CHAN
]

"guit" [2 CHANS
1 CHAN
 Pure
2 CHAN
 Broad
EVERY CHAN
 Delvib       Verylong
  ON PHSET    128 AMP
]

"maracca" [2 CHANS
1 CHAN
 ON RM
2 CHAN
 -4ØØ SHIFT
EVERY CHAN
 Metal       Drop            Puff
 -24 PITCH  ON PSENS  OFF PHSET
]

"mix" [M5MIX 48,125=T
1 SHARE 1 VOICES
 maracca 116 VOL
2 SHARE 1 VOICES
 snare   124 VOL
3 SHARE 1 VOICES
 electom
4 SHARE 1 VOICES
 Simpleins
PNUM SHARE
]

"mix1" [M5MIX
5 SHARE 3 VOICES Ringsyn
 96 VOL
6 SHARE 1 VOICES fullreed
 114 VOL
PNUM SHARE
]

"mix2" [M5MIX
5 SHARE 3 VOICES pufflute
 112 VOL
6 SHARE 1 VOICES guit
 124 VOL
PNUM SHARE
]

"part1a" [64=L
16 FOR( -3 Len 24, 1:CCCCCCCC )FOR
Ø,^
]

"part1b" [4Ø=L
18 FOR(  24,Ø:CCCCCCCC )FOR
]

"part1c" [192,^^ -3 Len
24,Ø:CCCCCCCC C^^^C^
]

"part1d" [192,^^^ 24,Ø:CCCCCCCC
]

"part2a" [64=L
16 FOR( 24,//X//X/X )FOR
]

"part2b" [5Ø=L
11 FOR( 48,/X/X  )FOR
        48,/X/24,XX
 5 FOR( 48,/X/X   )FOR
        48,/X/24,XX
]

"part2c" [192,^^ 24,Ø://X///X/ X^^^X^
]

"part2d" [192,^^^24,Ø://X///XX
[

"part3a" [64=L 12,
7 FOR( -2:GGG/D/g/ ggg/D/g/
          D///ggg/ D/D/ggg/  )FOR
       -2:GGG/D/g/ ggg/D/g/
        Ø:CC/Cgg/g dd/dgg/g
]

"part3b" [5Ø=L  24,
3 FOR( -1:CC/C/C//  gg/g/g// )FOR
       -1:CC/C/C// !CC^gddgg
4 FOR( -1:CC/C/C//  gg/g/g// )FOR
       -1:CC/C/C// !CC^gddgg
]

"part3c" [192,^^ 48, 145=T
12,-2:GGG/D/g/ ggg/D/g/ 24,g^^^g^
]

"part3d" [192,^^^ 96,^12,-1:GG/Gdd/d
]

"part4a" [64=L -12 Len 24,
4 FOR( -1:C^/C^C^C g^/g^g^g )FOR
       -2:A^/A^A^A d^/d^d^d
       -2:A^/A^A^A d^/d^d^d
       -2:G^/G^G^G f^/f^f^f
       -2:G^/G^G^G f^/f^f^f
Ø,^
]

"part4b" [5Ø=L
2 FOR(  24,-2:G//GG/// d//dd/// )FOR
24,-2: A//AA/// d//dd///
       G//GG/// G^^^^^^^
       G//GG/// C//CC///
       d//dd/// d//dd///
       G//GG/// f//ff///
       G//GG/// f//ff///
       G^^^^^^^ ^^^^^^^^
]

"part4c" [SCORE
48,-1:D/// D/// 24,g/gg/ggg g^^^!g^
]

"part4d" [192,1:G///
]

"part5a" [64=L    -6 Len
Ø,
4 FOR(Ø: E(GB)  rhyt
       d(+FB) rhyt )FOR
2 FOR(Ø: E(GC)  rhyt
      Ø: +F(AC) rhyt )FOR
2 FOR(Ø: D(+FB) rhyt
      Ø: C(FA)  rhyt )FOR
]

"part5b" [5Ø=L   48,  -4 Len
2 FOR(Ø: z  D(+FB)  z x
         z  c(EA)   z x )FOR
         z  c(EG)   z x
         z  c(+FA)  z x
         z  b(D+F)  z x
     b(D+F)zzz
         z  D(F+A)  z x
         z +D(G+A)  z x
         z  c(+FA)  z x
         z  c(+FA)  z x
2 FOR(Ø: z  D(+FB)  z x
         z  c(FA)   z x )FOR
   b(D+F)zzz
192,z
]

"part5c" [48,  Ø:z/C(12,+FA)/ ////
 Ø,    D(GB)rhyt
24,    D(GB)zzz  g(BD)z
]

"part5d" [192,1:^/
^^
]

"part5f" [64=L 24, -12 Len
4 FOR(Ø: z/  E(GB)z/E(GB)zE(GB)
         z/  d(+FB)z/d(+FB)zd(+FB) )FOR
2 FOR(Ø: z/  E(GC)z/E(GC)zE(GC)
      Ø: z/  +F(AC)z/+F(AC)z+F(AC) )FOR
      Ø: z/  D(+FB)zzD(+FB)zD(+FB)
      Ø: z/  C(FA)zzC(FA)zC(FA)
      Ø: z/  D(+FB)zzD(+FB)zD(+FB)
      Ø: z/  C(FA)zzC(FA)zC(FA)
Ø,z
]

"part6a" [K( +F )K
64=L -2 Len
-1: 12, ^/// BCD/ //// ////
 Ø: 24, /CbG d/// /ccD DEEF FFGd /b//
 Ø: 12, //// EFG/ //// ////
 Ø: 24, /FFe eddb
 Ø: 12, //// GAB/ //// ////
    24, /Cag ABf/
 Ø: 24, G/// //Ag fd/d /d/d
 Ø: 24, G/// //Ag fd/d /d/d
 Ø: 12, GAB/ //// //// a/g/
    24, =f=f/=f/=f/=f
 Ø: 12, GAB/ //// //// a/g/
    24, =f=f/=f/=f/=f
Ø,^
]

"part6b" [5Ø=L  K(+f)K
12, -1:  BaB/ //// //// ////
24,      /B/C /B/a g/// gfeF
24,      /d// //// G/// //fG
         A/// /ABC bD/D //// 192,^
24,  Ø: +A+A/+A //// +A+A/+A /g=F+d
         dd/d //// dd/d /cbC
         b//b b/// a//a a///
         B//B B/// a//a a///
         B^^^ ^^^^ ^^^^ ^^^^
]

"part6c" [-2 Len K(+F)K
24,Ø:F/^/ //FG A/A/ g/f/
     G^GG ^GGG G^^^ g^
]

"part6d" [192,1:^^^^
]
```

Continued ▶

MUSIC

◀ Continued

```
"pufflute" [2 CHANS
 1 CHAN

 Hollow Flat Puff
 ON RM 193 SHIFT
2 CHAN
Pure Slowvib Tailed
EVERY CHAN
 128 AMP
]

"rhyt" [24, z z x z z x z x Ø,
]

"snare" [2 CHANS
1 CHAN
ON RM
2 CHAN
 -4ØØ SHIFT
EVERY CHAN
Metal Drop Short

-24 PITCH OFF PSENS ON PHSET
]

"title" [DISPLAY
%
% There appears to be a slight technical
%  fault at present but normal service
%  will be resumed as soon as possible.
%
%   " Meanwhile here is some Music "
%
%        by Michael Harbour 1989
%
]

"x" [ X(XX)]
"z" [ ^(^^)]
>
```

RISC REVUE

Listing 1

```
   1Ø REM >Interfere (RR1)
   2Ø REM Interference Patterns
   3Ø REM by Simon Levitt
   4Ø REM for Archimedes Only
   5Ø REM (c) BAU July 199Ø
   6Ø :
   7Ø MODE 13
   8Ø ON ERROR PROCerror
   9Ø *FX 4,1
  1ØØ CLEAR
  11Ø start%=TRUE
  12Ø REPEAT
  13Ø *FX 113,1
  14Ø *FX 112,1
  15Ø PROCmouse
  16Ø PROCanimate
  17Ø start%=FALSE
  18Ø UNTIL Ø
  19Ø :
  2ØØ DEF PROCmouse
  21Ø CLS
  22Ø IF start% THEN
  23Ø PROCinputdetails
  24Ø PROCdrawcrosses
  25Ø ENDIF
  26Ø PROCdrawcrosses
  27Ø REPEAT
  28Ø MOUSE X%,Y%,Z%
  29Ø acx%=X%/4:acy%=Y%/4
  3ØØ PROCvariable(8ØØ,1Ø16,Ø,"X Co-ord:
    ",acx%*zoom%-(size%/2))
  31Ø PROCvariable(8ØØ,98Ø,Ø,"Y Co-ord:
    ",acy%*zoom%-(size%/2))
  32Ø PROCvariable(Ø,1Ø16,1,"(S)ource:
   ",sce%)
  33Ø PROCvariable(Ø,98Ø,2,"(A)mplitude:
    ",amp%)
  34Ø PROCvariable(Ø,944,3,"(F)requency:
    ",freq%)
  35Ø PROCvariable(Ø,9Ø8,4,"(Z)oom:
",zoom%)
  36Ø IF Z%=1 OR Z%=4 THEN PROCmovecross
  37Ø amp%(sce%)=amp%:freq%(sce%)=freq%
  38Ø WAIT
  39Ø PROCkeys
  4ØØ UNTIL Z%=2
  41Ø PROCsetupsources
  42Ø ENDPROC
  43Ø :
  44Ø DEF PROCmovecross
  45Ø PROCcross((xcent%(sce%)*4)/zoom%,(
ycent%(sce%)*4)/zoom%,FALSE,zoom%)
  46Ø xcent%(sce%)=acx%*zoom%
  47Ø ycent%(sce%)=acy%*zoom%
  48Ø PROCdrawcrosses
  49Ø ENDPROC
  5ØØ :
  51Ø DEF PROCdrawcrosses
  52Ø FOR I%=1 TO noofsources%
  53Ø PROCcross((xcent%(I%)*4)/zoom%,(yc
ent%(I%)*4)/zoom%,TRUE,zoom%)
  54Ø NEXT
  55Ø ENDPROC
  56Ø :
  57Ø DEF PROCinputdetails
  58Ø GCOL 63 TINT 255
  59Ø INPUTTAB(Ø,Ø);"No. of sources";noo
fsources%
  6ØØ REPEAT
  61Ø INPUTTAB(Ø,Ø);"Display size (pixel
s sq) (64/128/256)";size%
  62Ø UNTIL size%=64 OR size%=128 OR siz
e%=256
  63Ø PROCvariables
  64Ø VDU 5
  65Ø ENDPROC
  66Ø :
  67Ø DEF PROCkeys
  68Ø incr%=Ø:drawcross%=FALSE
  69Ø char%=INKEY(Ø)
  7ØØ IF char%=83 cha%=1
  71Ø IF char%=65 cha%=2
  72Ø IF char%=7Ø cha%=3
  73Ø IF char%=9Ø cha%=4
  74Ø IF char%=139 incr%=1
  75Ø IF char%=138 incr%=-1
  76Ø CASE cha% OF
  77Ø WHEN 1:sce%+=incr%
  78Ø WHEN 2:amp%+=(incr%*25)
  79Ø WHEN 3:freq%+=incr%
  8ØØ WHEN 4:oldz%=zoom%:zoom%=zoom%*(2^
incr%)
  81Ø ENDCASE
  82Ø IF sce%>noofsources% sce%=1
  83Ø IF sce%<1 sce%=noofsources%
  84Ø IF amp%>2ØØ amp%=5Ø
  85Ø IF amp%<5Ø amp%=2ØØ
  86Ø IF freq%>12 freq%=1
  87Ø IF freq%<1 freq%=12
  88Ø IF zoom%<1 zoom%=8
  89Ø IF zoom%>8 zoom%=1
  9ØØ IF incr%<>Ø THEN
  91Ø IF cha%=1 THEN
  92Ø freq%=freq%(sce%)
  93Ø amp%=amp%(sce%)
  94Ø ENDIF
  95Ø IF cha%=4 PROCredrawcrosses
  96Ø ENDIF
  97Ø ENDPROC
  98Ø :
  99Ø DEF PROCredrawcrosses
 1ØØØ FOR I%=1 TO noofsources%
 1Ø1Ø PROCcross((xcent%(I%)*4)/oldz%,(yc
ent%(I%)*4)/oldz%,FALSE,oldz%)
 1Ø2Ø PROCcross((xcent%(I%)*4)/zoom%,(yc
ent%(I%)*4)/zoom%,TRUE,zoom%)
 1Ø3Ø NEXT
 1Ø4Ø ENDPROC
 1Ø5Ø :
 1Ø6Ø DEF PROCvariable(xpos%,ypos%,opt%,
string$,var%)
 1Ø7Ø ORIGIN Ø,Ø
 1Ø8Ø MOVE xpos%,ypos%
 1Ø9Ø IF cha%=opt% THEN GCOL 3 TINT Ø EL
SE GCOL 63 TINT 255
 11ØØ PRINTstring$;CHR$(127);CHR$(127);C
HR$(127);CHR$(127);CHR$(127);var%
 111Ø ORIGIN xorigin%,yorigin%
 112Ø GCOL 63 TINT 255
 113Ø ENDPROC
 114Ø :
 115Ø DEF PROCcross(x%,y%,draw%,zoom%)
 116Ø IF draw% THEN GCOL 63 TINT 255 ELS
E GCOL Ø TINT Ø
 117Ø xorigin%=(128Ø-((size%*4)/zoom%))/
2
 118Ø yorigin%=(1Ø24-((size%*4)/zoom%))/
2
 119Ø ORIGIN xorigin%,yorigin%
 12ØØ MOUSERECTANGLE -xorigin%,-yorigin%
,128Ø,1Ø24
 121Ø RECTANGLE Ø,Ø,(size%*4)/zoom%
 122Ø LINE x%,y%-(32/zoom%),x%,y%+(32/zo
om%)
 123Ø LINE x%-(32/zoom%),y%,x%+(32/zoom%
),y%
 124Ø GCOL 63 TINT 255
 125Ø ENDPROC
 126Ø :
 127Ø DEF PROCmousewait
 128Ø REPEAT
 129Ø MOUSE X%,Y%,Z%
 13ØØ UNTIL Z%=Ø
 131Ø ENDPROC
 132Ø :
 133Ø DEF PROCvariables
 134Ø DIM dist% 18Ø*noofsources%,bascol%
(45)
 135Ø DIM space size%*size%*noofsources%
 136Ø DIM xcent%(noofsources%),ycent%(no
ofsources%)
 137Ø DIM amp%(noofsources%),freq%(noofs
ources%)
 138Ø DIM colour% 16,code% 2Ø48
 139Ø amp%=5Ø:freq%=1:cha%=2
 14ØØ screen%=1:sce%=1:zoom%=1
 141Ø inc%=4ØØ/15
 142Ø *FX 112,2
 143Ø CLS
 144Ø *FX 112,1
 145Ø CLS
 146Ø RESTORE
 147Ø FOR I%=Ø TO 15
 148Ø READ colour%?(I%)
 149Ø NEXT
 15ØØ FOR I%=Ø TO 45
 151Ø READ bascol%(I%)
 152Ø NEXT
 153Ø PROCarmcode
 154Ø CLS
 155Ø *POINTER
 156Ø FOR I%=1 TO noofsources%
 157Ø amp%(I%)=amp%
 158Ø freq%(I%)=freq%
 159Ø NEXT I%
 16ØØ ENDPROC
 161Ø :
 162Ø DEF PROCsetupsources
 163Ø ORIGIN Ø,Ø
 164Ø GCOL 3 TINT 255
 165Ø MOVE 164,528
 166Ø PRINT "Setting up sources-please w
ait"
 167Ø *FX 112,2
 168Ø CALL setup
 169Ø FOR K%=1 TO noofsources%
 17ØØ FOR I%=Ø TO 18Ø
 171Ø col%=7+(amp%(K%)*SIN(RAD(freq%(K%)
*I%*4))) DIV inc%
 172Ø dist%?((18Ø*(K%-1))+I%)=col%
 173Ø NEXT
 174Ø mindist%=(SQR(2*2^3Ø))
 175Ø maxdist%=Ø
 176Ø PROCchecklimits(SQR(xcent%(K%)^2+y
cent%(K%)^2) )
 177Ø PROCchecklimits(SQR(xcent%(K%)^2+(
ycent%(K%)-size%)^2))
 178Ø PROCchecklimits(SQR((xcent%(K%)-si
ze%)^2+(ycent%(K%)-size%)^2))
 179Ø PROCchecklimits(SQR((xcent%(K%)-si
ze%)^2+ycent%(K%)^2))
 18ØØ PROCcheckifcornerisnearest
 181Ø FOR I%=maxdist%*4 TO mindist%*4 ST
EP -4
 182Ø polcol%=((I%/4) MOD 18Ø)
 183Ø GCOL bascol%(polcol% DIV 4) TINT 6
4*(polcol% MOD 4)
 184Ø CIRCLE FILL xcent%(K%)*4,(1Ø24-(si
ze%*4))+ycent%(K%)*4,I%
 185Ø NEXT
 186Ø A%=space+((K%-1)*(size%^2))
 187Ø CALL setarray
 188Ø NEXT
 189Ø ENDPROC
 19ØØ :
 191Ø DEF PROCcheckifcornerisnearest
 192Ø flag%=FALSE
 193Ø IF xcent%(K%)>=Ø AND xcent%(K%)<=s
ize% THEN
 194Ø flag%=TRUE
 195Ø IF ycent%(K%)<Ø THEN mindist%=Ø-yc
ent%(K%)
 196Ø IF ycent%(K%)>size% THEN mindist%=
ycent%(K%)-size%
 197Ø ENDIF
 198Ø IF ycent%(K%)>=Ø AND ycent%(K%)<=s
ize% THEN
 199Ø IF flag% THEN mindist%=Ø
 2ØØØ IF xcent%(K%)<Ø THEN mindist%=Ø-xc
ent%(K%)
 2Ø1Ø IF xcent%(K%)>size% THEN mindist%=
xcent%(K%)-size%
 2Ø2Ø ENDIF
 2Ø3Ø ENDPROC
 2Ø4Ø :
 2Ø5Ø DEF PROCanimate
 2Ø6Ø CLS
 2Ø7Ø PROCswap
 2Ø8Ø REPEAT
 2Ø9Ø CALL setup
 21ØØ A%=noofsources%
 211Ø B%=size%
 212Ø A%=USR(display)
 213Ø PROCswap
 214Ø UNTIL INKEY(-99)
 215Ø ENDPROC
 216Ø :
 217Ø DEF PROCswap
 218Ø OSCLI"FX112,"+STR$(screen%)
 219Ø screen%=3-screen%
 22ØØ WAIT
 221Ø OSCLI"FX113,"+STR$(screen%)
 222Ø CLS
 223Ø ENDPROC
 224Ø :
 225Ø DEF PROCchecklimits(distance%)
 226Ø IF distance%>maxdist% THEN maxdist
%=distance%
 227Ø IF distance%<mindist% THEN mindist
%=distance%
 228Ø ENDPROC
 229Ø :
 23ØØ DEF PROCerror
 231Ø VDU 4:CLS:OFF
 232Ø IF ERR=17:IF INKEY-1 MODE 13:END E
LSE ENDPROC
 233Ø IF ERR=11 THEN
 234Ø PRINTTAB(Ø,Ø);"Not enough memory f
or all arrays"
 235Ø PRINTTAB(1Ø,1);"Press any key"
 236Ø g=GET
 237Ø ENDPROC
 238Ø ENDIF
 239Ø *FX 112,1
 24ØØ *FX 113,1
 241Ø PRINT REPORT$;" at line ";ERL
 242Ø END
 243Ø ENDPROC
 244Ø :
 245Ø DEF PROCarmcode
 246Ø FOR pass=Ø TO 2 STEP 2
 247Ø P%=code%
 248Ø [OPT pass
 249Ø .setup
 25ØØ STMFD R13!,{R14}
 251Ø ADR RØ,screen
 252Ø ADR R1,screenad
 253Ø SWI "OS_ReadVduVariables"
 254Ø LDMFD R13!,{R15}
 255Ø :
 256Ø .setarray
 257Ø SWI "OS_RemoveCursors"
 258Ø STMFD R13!,{R14}
 259Ø LDR R12,screenad
 26ØØ MOV R11,RØ
 261Ø MOV R1Ø,#Ø
 262Ø MOV R6,#Ø
 263Ø .loopa
 264Ø MOV R9,#Ø
 265Ø .loopa1
 266Ø MOV R8,#32Ø
 267Ø MUL R8,R1Ø,R8
 268Ø ADD R8,R8,R9
 269Ø LDRB R7,[R12,R8]
 27ØØ STRB R7,[R11,R6]
 271Ø ADD R6,R6,#1
 272Ø ADD R9,R9,#1
 273Ø CMP R9,#size%-1
 274Ø BLO loopa1
 275Ø ADD R6,R6,#1
 276Ø ADD R1Ø,R1Ø,#1
 277Ø CMP R1Ø,#size%-1
 278Ø BLO loopa
 279Ø LDMFD R13!,{R15}
 28ØØ :
 281Ø .display
 282Ø STMFD R13!,{R14}
 283Ø LDR R12,screenad
 284Ø LDR R2,colad
 285Ø LDR R11,spacead
 286Ø LDR R1Ø,distad
 287Ø ADD RØ,R1Ø,#(18Ø*noofsources%)
 288Ø ADD R7,R11,#(size%*(size%-1))
 289Ø MOV R4,#(size%*size%)
 29ØØ .loop
 291Ø MOV R8,#(size%-2)
 292Ø MOV R3,#Ø
 293Ø .loop1
 294Ø MOV R9,R11
 295Ø MOV R5,R1Ø
 296Ø .loop2
 297Ø LDRB R6,[R9]
 298Ø SUBS R6,R6,#1      \No. of steps fo
rward for each frame
 299Ø ADDMI R6,R6,#18Ø
 3ØØØ STRB R6,[R9],R4
 3Ø1Ø LDRB R6,[R5,R6]
 3Ø2Ø ADD R3,R3,R6
```

Continued ▶

RISC REVUE

◀ Continued

```
3Ø3Ø ADD R5,R5,#18Ø
3Ø4Ø CMP R5,RØ
3Ø5Ø BLO loop2
3Ø6Ø MOV R9,#Ø
3Ø7Ø MOV R5,#noofsources%
3Ø8Ø .div
3Ø9Ø SUBS R3,R3,R5
31ØØ ADD R9,R9,#1
311Ø BPL div
312Ø LDRB R9,[R2,R9]
313Ø STRB R9,[R12],#1
314Ø ADD R11,R11,#1
315Ø SUBS R8,R8,#1
316Ø BPL loop1
317Ø ADD R11,R11,#1
318Ø ADD R12,R12,#(32Ø-(size%))
319Ø ADD R12,R12,#1
32ØØ CMP R11,R7
321Ø BLO loop
322Ø LDMFD R13!,{R15}
323Ø :
324Ø .screen
325Ø EQUD 148
326Ø EQUD -1
327Ø .screenad
328Ø EQUD ØØ
329Ø .distad
33ØØ EQUD dist%
331Ø .spacead
332Ø EQUD space
333Ø .colad
334Ø EQUD colour%
335Ø ]
336Ø NEXT
337Ø ENDPROC
338Ø :
339Ø REM Height Colour Data
34ØØ DATA Ø,1,2,3,44,45,46,47,2Ø8,2Ø9,2
1Ø,211,252,253,254,255
341Ø :
342Ø REM Screen Colour Data
343Ø DATA Ø,1,16,17,2,3,18,19,4,5,2Ø,21
,6,7,22,23,8,9,24,25,1Ø,11,26,27
344Ø DATA 12,13,28,29,14,15,3Ø,31,32,33
,48,49,34,35,5Ø,51,36,37,52,53,38,39
```

Listing 2

```
1Ø REM >Confirm (RR2)
2Ø REM by Dave Acton
3Ø REM for Archimedes Only
4Ø REM (c) BAU July 199Ø
5Ø :
6Ø MODE Ø
7Ø *POINTER
8Ø PRINT"My dog's got no nose."
9Ø PRINT"Do you really want to know h
ow it smells?"
1ØØ IF FNconfirm PRINT"Terrible!" ELSE
PRINT"I won't tell you then."
11Ø *POINTER Ø
12Ø END
13Ø :
14Ø DEF FNconfirm
15Ø SYS "OS_Confirm" TO ;flags%
16Ø =(flags% AND 4)>Ø
```

Listing 3

```
1Ø REM >Checkfile (RR3)
2Ø REM by Dave Acton
3Ø REM for Archimedes Only
4Ø REM (c) BAU July 199Ø
5Ø :
6Ø chunk%=&1ØØØ
7Ø DIM work% chunk%
8Ø REPEAT
9Ø INPUT"Checksum which file? "file$
1ØØ in%=OPENIN(file$)
11Ø UNTIL in%>Ø
12Ø PRINT"Checking..."
13Ø check%=Ø
14Ø WHILE NOT EOF#in%
15Ø SYS "OS_GBPB",4,in%,work%,chunk% T
O ,,,notread%
16Ø read%=chunk%-notread%
17Ø IF read%>Ø THEN SYS "OS_CRC",check
%,work%,work%+read%,1 TO check%
18Ø ENDWHILE
19Ø CLOSE#in%
2ØØ PRINT"Checksum is ";check%
21Ø END
```

GENETICS

Listing 1

```
1ØØØ REM GREGOR
1Ø1Ø REM Genetic algorithm-based curve-
matching program
1Ø2Ø REM by William Bains
1Ø25 REM for B/B+/M/C/A
1Ø26 REM (c) BAU July 199Ø
1Ø3Ø :
1Ø4Ø DIM pop$(5Ø), score(5Ø), arith$(4)
, answer(1ØØ,3), temp(5Ø), var$(2Ø)
1Ø5Ø :
1Ø6Ø REM Program setup
1Ø7Ø :
1Ø8Ø arith$(1)="+": arith$(2)="-": arit
h$(3)="*": arith$(4)="/"
1Ø9Ø FOR i=1 TO 5: var$(i)="x": var$(i+
5)="y": NEXT
11ØØ FOR i=1 TO 9: var$(1Ø+i)=STR$(i):
NEXT
111Ø totpop=2Ø: maxlen=7Ø: sexprob=1.5:
 best=1ØØØØØ
112Ø FOR i=1 TO totpop
113Ø    pop$(i)=var$(RND(19))+arith$(RND
(4))+var$(RND(19))+arith$(RND(4))+var$(R
ND(19))
114Ø    score(i)=1ØØØØØ
115Ø NEXT
116Ø :
117Ø REM Input the values aginst which
the equation is to be matched
118Ø :
119Ø INPUT "How many data points do you
 intend to enter ";dat
12ØØ PRINT: PRINT "Please enter x,y,z v
alues "
121Ø FOR i=1 TO dat
122Ø    INPUT answer(i,1),answer(i,2),an
swer(i,3)
123Ø NEXT
124Ø :
125Ø REM Display the start screen
126Ø :
127Ø CLS: FOR point=1 TO totpop
128Ø    PROCdis
129Ø NEXT
13ØØ :
131Ø REM The main program.
132Ø REM This selects the member of 'po
p$' which has the highest score
133Ø :
134Ø mx=Ø
135Ø FOR i=1 TO totpop
136Ø    IF score(i)>mx THEN mx=score(i):
 target=i
137Ø NEXT
138Ø :
139Ø REM Now we either mutate or sexual
ly replace the target 'pop$'
14ØØ :
141Ø k=RND(sexprob+1)
142Ø IF k>=2 THEN PROCsex: GOTO 145Ø
143Ø point=RND(totpop): IF point=target
 THEN GOTO 143Ø
144Ø PROCmute
145Ø pop$(target)=new$: point=target
146Ø :
147Ø REM And this section values and di
splays the new string
148Ø :
149Ø score(target)=Ø
15ØØ ON ERROR GOTO 166Ø
151Ø j=1
152Ø    x=answer(j,1): y=answer(j,2)
153Ø    z=EVAL(pop$(target))
154Ø    score(target)=score(target)+ABS(
z-answer(j,3))
155Ø    j=j+1
156Ø IF j<=dat THEN GOTO 152Ø
157Ø ON ERROR OFF
158Ø PROCdis
159Ø IF score(target)>=best THEN GOTO 1
31Ø
16ØØ :
161Ø REM If this is the best score so f
ar, write it at the bottom of the screen
162Ø :
163Ø PRINT TAB(1,28); STRING$((maxlen+1
Ø)," "); TAB(1,28); pop$(target);" => ";
score(target)
164Ø IF score(target)=Ø THEN STOP
165Ø best=score(target): GOTO 131Ø
166Ø score(target)=1ØØØØØØ: GOTO 157Ø
167Ø :
168Ø REM Line 15ØØ is an error trap to
catch errors in the 'pop$'
169Ø REM string being evaluated (usuall
y divide-by-zero) and return
17ØØ REM a very high 'score' if one occ
urs.
171Ø :
172Ø DEF PROCdis
173Ø :
174Ø REM This routine displays the equa
tion pointed to by 'point'
175Ø :
176Ø PRINT TAB(1,point);STRING$((maxlen
+1Ø)," ")
177Ø PRINT TAB(1,point);pop$(point);" =
> ";score(point)
178Ø ENDPROC
179Ø :
18ØØ DEF PROCsex
181Ø :
182Ø REM This routine selects two of th
e population at random and
183Ø REM 'sexually' recombines them.
184Ø :
185Ø REM Select the two target pop$() e
ntries to be used (x,y), and the
186Ø REM point (a,b) at which they are
to be recombined
187Ø :
188Ø x=RND(totpop): IF x=target THEN GO
TO 188Ø
189Ø y=RND(totpop): IF x=y THEN GOTO 18
9Ø
19ØØ IF y=target THEN GOTO 189Ø
191Ø a=RND(LEN(pop$(x)))
192Ø b=RND(LEN(pop$(y)))
193Ø ty=Ø
194Ø :
195Ø REM Find the nearest arithmetic op
erator to a and b.
196Ø :
197Ø FOR zap=LEN(pop$(x)) TO a STEP -1
198Ø    point=x: PROCarch
199Ø NEXT
2ØØØ IF ty<>Ø THEN GOTO 2Ø4Ø
2Ø1Ø FOR zap=1 TO a
2Ø2Ø    point=x: PROCarch
2Ø3Ø NEXT
2Ø4Ø tx=ty: ty=Ø
2Ø5Ø FOR zap=LEN(pop$(y)) TO b STEP -1
2Ø6Ø    point=y: PROCarch
2Ø7Ø NEXT
2Ø8Ø IF ty<>Ø THEN GOTO 215Ø
2Ø9Ø FOR zap=1 TO b
21ØØ    point=y: PROCarch
211Ø NEXT
212Ø :
213Ø REM And maker a 'new$' out of the
two halves of the pop$(x and y)
214Ø :
215Ø new$=MID$(pop$(x),1,tx)+MID$(pop$(
y),(ty+1))
216Ø IF LEN(new$)>maxlen THEN GOTO 18ØØ
217Ø IF LEN(new$)<2 THEN GOTO 18ØØ
218Ø ENDPROC
219Ø :
22ØØ DEF PROCarch
221Ø :
222Ø REM This routine checks if somethi
ng is an artithmetic operator
223Ø :
224Ø FOR j=1 TO 4
225Ø    IF MID$(pop$(point),zap,1)=arith
$(j) THEN ty=zap
226Ø NEXT
227Ø ENDPROC
228Ø :
229Ø DEF PROCvar
23ØØ :
231Ø REM This routine checks if somethi
ng is a variable.
232Ø :
233Ø FOR j=1 TO 19
234Ø    IF MID$(pop$(point),zap,1)=var$(
j) THEN ty=zap
235Ø NEXT
236Ø ENDPROC
237Ø :
238Ø DEF PROCmute
239Ø :
24ØØ REM This procedure mutates string
pointed to by 'point'. There are
241Ø REM four possibilities: replace an
 arithmetic operator, replace
242Ø REM a variable, delete a variable
(+ operator), insert a variable
243Ø REM (+ operator).
244Ø :
245Ø q=RND(4)
246Ø :
247Ø REM Chose to replace an operator
248Ø :
249Ø IF q=1 THEN PROCarr: GOTO 272Ø
25ØØ :
251Ø REM Otherwise, replace a variable
by something. First find the variable
252Ø :
253Ø a=RND(LEN(pop$(point)))
254Ø ty=Ø
255Ø FOR zap=LEN(pop$(point)) TO a STEP
 -1
256Ø    PROCvar
257Ø NEXT
258Ø IF ty<>Ø THEN GOTO 262Ø
259Ø FOR zap=2 TO a
26ØØ    PROCvar
261Ø NEXT
262Ø new$=MID$(pop$(point),1,(ty-1))
263Ø new2$=MID$(pop$(point),(ty+1))
264Ø :
265Ø REM Then select the mutation type.
266Ø :
267Ø q=RND(3)
268Ø IF q=1 THEN PROCdel
269Ø IF q=2 THEN PROCins
27ØØ IF q=3 THEN PROCvarr
271Ø new$=new$+bit$+new2$
272Ø ENDPROC
273Ø :
274Ø DEF PROCdel
275Ø :
276Ø REM This routine generates a blank
 string to form a deletion
277Ø :
278Ø bit$=""
279Ø new2$=MID$(new2$,2)
28ØØ ENDPROC
281Ø DEF PROCins
282Ø :
283Ø REM This routine generates a new s
tring of 1 - 1Ø 'var'+'arith' units
284Ø :
285Ø bit$=var$(RND(19))
286Ø kk=RND(1Ø)
287Ø FOR kl=1 TO kk
288Ø    bit$=bit$+arith$(RND(4))+var$(RN
D(19))
289Ø NEXT
29ØØ ENDPROC
291Ø :
292Ø DEF PROCvarr
293Ø :
294Ø REM This routine generates one var
iable
295Ø :
296Ø bit$=var$(RND(19))
297Ø ENDPROC
298Ø :
299Ø DEF PROCarr
3ØØØ :
3Ø1Ø REM This routine replaces an opera
tor with another.
3Ø2Ø :
3Ø3Ø ty=Ø
3Ø4Ø :
3Ø5Ø REM First find the operator
3Ø6Ø :
3Ø7Ø a=RND(LEN(pop$(point)))
3Ø8Ø FOR zap=LEN(pop$(point)) TO a STEP
 -1
3Ø9Ø    PROCarch
31ØØ NEXT
311Ø IF ty<>Ø THEN GOTO 318Ø
312Ø FOR zap=1 TO a
313Ø    PROCarch
314Ø NEXT
315Ø :
316Ø REM Then add it into the string
317Ø :
318Ø new$=MID$(pop$(point),1,(ty-1))+ar
ith$(RND(4))+MID$(pop$(point),(ty+1))
319Ø ENDPROC
```

Listing 2

```
1ØØØ REM GREGOR-FIX.
1Ø1Ø REM This section replaces Lines 13
1Ø-138Ø inclusive on GREGOR
1Ø2Ø REM to make the selection of a pop
$ entry to be replaced stochastic.
1Ø3Ø :
131Ø REM The main program.
1315 REM This section selects a member
of pop$ randomly, but with a
132Ø REM frequency biassed towards pop$
 entries with large 'score' values.
1325 :
133Ø mx=Ø: FOR i=1 TO totpop
1335    mx=mx+score(i)
```

Continued ▶

GENETICS

◀ Continued

```
1340 NEXT
1345 temp(1)=score(1)*100/mx
1350 FOR i=2 TO totpop
1355   temp(i)=temp(i-1)+score(i)*100/m
x
1360 NEXT
1365 k=RND(100): target=1
1370 FOR i=1 TO totpop
1375   IF temp(i)<k THEN target=i+1
1380 NEXT
```

IMAGE ANALYSIS

Listing 1

```
   10 REM >Histogram
   20 REM by David Knell
   30 REM for B/B+/M/C/A
   40 REM (c) BAU July 1990
   50 :
   60 REM ImageHistogram produces a hist
ogram of the grey
   70 REM levels in an image.
   80 REM
   90 REM Call with PROCImageHistogram(h
ist%, grey%, x%, y%) where:
  100 REM hist% contains the start addre
ss of a block of memory
  110 REM       with room for an integer
 for each permissible grey
  120 REM       level in the image
  130 REM grey% contains the number of g
rey levels in the image
  140 REM x% & y% give the size of the i
mage
  150 REM
  160 REM PlotHistogram plots the histog
ram returned by ImageHistogram.
  170 REM
  180 REM Call with PROCPlotHistogram(hi
st%, grey%) where hist% and grey%
  190 REM are as above.
  200 :
  210 REM Example for a Mode 2 screen:
  220 grey% = 16:          REM 16 possible
 colours, 0-15
  230 DIM hist% 4*grey%: REM 4 bytes per
 grey level
  240 MODE 2:              REM Put somethi
ng on the screen
  250 FOR y%=0 TO 64
  260   FOR x%=0 TO 80
  270     GCOL 0, RND(5)+RND(5)+RND(5)
  280     PLOT 69, x%*8, y%*4
  290   NEXT x%
  300 NEXT y%
  310 PROCImageHistogram(hist%, grey%, 8
0, 64)
  320 PROCPlotHistogram(hist%, grey%)
  330 END
  340 :
  350 REM Function to read a pixel value
 from a Mode 2 screen
  360 DEF FNReadPixel(x%, y%)
  370 = POINT(x%*8, y%*4)
  380 :
  390 REM Compute the histogram of an im
age
  400 DEF PROCImageHistogram(hist%, grey
%, x%, y%)
  410 LOCAL xx%, yy%, pix%
  420 FOR xx% = 0 TO grey%-1
  430   hist%!(xx%*4) = 0
  440 NEXT xx%
  450 FOR yy% = 0 TO y%-1
  460   FOR xx% = 0 TO x%-1
  470     pix% = FNReadPixel(xx%, yy%)
  480     IF pix% >= 0 AND pix% < grey%
THEN hist%!(pix%*4) = hist%!(pix%*4) + 1
  490  NEXT xx%
  500 NEXT yy%
  510 ENDPROC
  520 :
  530 REM Plot the histogram on screen
  540 DEF PROCPlotHistogram(hist%, grey%
)
  550 LOCAL i%, max%, xl%, xh%
  560 max% = 0:            REM Find the bi
n with the most in
  570 FOR i% = 0 TO grey%-1
  580   IF hist%!(i%*4) > max% THEN max%
 = hist%!(i%*4)
  590 NEXT i%
  600 MODE 1:              REM Now plot th
e histogram
  610 FOR i%=0 TO grey%-1
  620   xl% = (1280*i%) / grey%
  630   xh% = (1280*(i%+1)) / grey%
  640   MOVE xl%, 0
  650   MOVE xh%, 0
  660   PLOT 85, xl%, (1024*hist%!(i%*4)
) / max%
  670   PLOT 85, xh%, (1024*hist%!(i%*4)
) / max%
  680 NEXT i%
  690 ENDPROC
```

Listing 2

```
   10 REM >Stretch
   20 REM by David Knell
   30 REM for B/B+/M/C/A
   40 REM (c) BAU July 1990
   50 :
   60 REM StretchHistogram expands part
of the grey range of an
   70 REM image to fill the entire space
 available
   80 REM
   90 REM Call with PROCStretchHistogram
(grey%, lo%, hi%, x%, y%) where:
  100 REM grey% contains the number of g
rey levels in the image
  110 REM lo% & hi% give the grey levels
 to be expanded to black
  120 REM              and white respective
ly
  130 REM x% & y% give the size of the i
mage
  140 :
  150 REM Example for a Mode 2 screen:
  160 grey% = 16:          REM 16 possible
 colours, 0-15
  170 DIM hist% 4*grey%: REM 4 bytes per
 grey level
  180 :
  190 REM Load a picture here
  200 PROCStretchHistogram(grey%, 0, 7,
80, 64)
  210 END
  220 :
  230 REM Functions to read & write pixe
ls from a Mode 2 screen
  240 DEF FNReadPixel(x%, y%)
  250 = POINT(x%*8, y%*4)
  260 :
  270 DEF PROCWritePixel(x%, y%, col%)
  280 GCOL 0, col%
  290 PLOT 69, x%*8, y%*4
  300 ENDPROC
  310 :
  320 REM Procedure to stretch a histogr
am
  330 DEF PROCStretchHistogram(grey%, lo
%, hi%, x%, y%)
  340 LOCAL xx%, yy%, pix
  350 FOR yy%=0 TO y%-1
  360   FOR xx%=0 TO x%-1
  370     pix = FNReadPixel(xx%, yy%) +
RND(1) - 0.5: REM Dither
  380     pix = ((pix-lo%) * grey%) / (h
i%-lo%)
  390     IF pix < 0 THEN pix = 0
  400     IF pix >= grey% THEN pix = gre
y%-1
  410     PROCWritePixel(xx%, yy%, pix)
  420   NEXT xx%
  430 NEXT yy%
  440 ENDPROC
```

Listing 3

```
   10 REM >Equal
   20 REM by David Knell
   30 REM for B/B+/M/C/A
   40 REM (c) BAU July 1990
   50 :
   60 REM EqualiseHistogram remaps the p
ixels of an image so that
   70 REM its histogram is approximately
 flat,
   80 REM i.e. there are the same number
 of pixels with
   90 REM each grey value.
  100 REM
  110 REM Call with PROCEqualiseHistogra
m(hist%, grey%, x%, y%) where:
  120 REM hist% has room for the image's
 histogram plus one more entry
  130 REM grey% contains the number of g
rey levels in the image
  140 REM x% & y% give the size of the i
mage
  150 :
  160 REM Example for a Mode 2 screen:
  170 :
  180 grey% = 16:             REM 16 poss
ible colours, 0-15
  190 DIM hist% (4*grey%+4): REM 4 bytes
 per grey level
  200 :
  210 REM Load a picture here
  220 :
  230 PROCEqualiseHistogram(hist%, grey%
, 80, 64)
  240 :
  250 END
  260 :
  270 REM Procedure to equalise a histog
ram
  280 :
  290 DEF PROCEqualiseHistogram(hist%, g
rey%, x%, y%)
  300 LOCAL xx%, yy%, pix, pixl%, freq,
pixcount%
  310 PROCImageHistogram(hist%, grey%, x
%, y%)
  320 FOR xx% = 1 TO grey%-1: REM Calcul
ate cumulative frequency graph
  330   hist%!(xx%*4) = hist%!(xx%*4) +
hist%!(xx%*4-4)
  340 NEXT xx%
  350 pixcount% = x%*y%: REM Total numbe
r of pixels in image
  360 hist%!(grey%*4) = pixcount%
  370 FOR yy%=0 TO y%-1
  380   FOR xx%=0 TO x%-1
  390     pix = FNReadPixel(xx%, yy%) +
RND(1) - 0.5: REM Dither
  400     IF pix < 0 THEN pix = 0
  410 :
  420 REM Calculate cumulative frequency
 for this pixel value
  430     pixl% = pix
  440     freq = hist%!(4*pixl%)*(1-(pix
-pixl%)) + hist%!(4*pixl%+4)*(pix-pixl%)
  450 :
  460 REM And work out correct grey leve
l
  470     pix = grey%*freq/(pixcount%+1)
  480     PROCWritePixel(xx%, yy%, pix)
  490   NEXT xx%
  500 NEXT yy%
  510 ENDPROC
```

Listing 4

```
   10 REM >Threshold
   20 REM by David Knell
   30 REM for B/B+/M/C/A
   40 REM (c) BAU July 1990
   50 :
   60 REM Threshold thresholds an image:
 the pixel values are set to
   70 REM 0 or 1 depending on whether a
pixel is regarded as part of
   80 REM an object or not.
   90 REM
  100 REM Call with PROCThreshold(lo%, h
i%, x%, y%) where:
  110 REM lo% and hi% give the lowest an
d highest grey levels which
  120 REM are to be regarded as being pa
rt of an object.
  130 REM x% & y% give the size of the i
mage.
  140 REM
  150 :
  160 REM Example for a Mode 2 screen:
  170 MODE 2:              REM Put somethi
ng on the screen
  180 FOR y%=0 TO 63
  190   FOR x%=0 TO 79
  200     GCOL 0, RND(7)
  210     PLOT 69, x%*8, y%*4
  220   NEXT x%
  230 NEXT y%
  240 PROCThreshold(0, 3, 80, 64): REM T
hreshold for lower grey levels
  250 END
  260 :
  270 REM Function to read & write pixel
 values from a Mode 2 screen
  280 DEF FNReadPixel(x%, y%)
  290 = POINT(x%*8, y%*4)
  300 :
  310 DEF PROCWritePixel(x%, y%, col%)
  320 GCOL 0, col%
  330 PLOT 69, x%*8, y%*4
  340 ENDPROC
  350 :
  360 REM Threshold an image
  370 DEF PROCThreshold(lo%, hi%, x%, y%
)
  380 LOCAL xx%, yy%, pix%
  390 FOR yy% = 0 TO y%-1
  400   FOR xx% = 0 TO x%-1
  410     pix% = FNReadPixel(xx%, yy%)
  420     IF pix% >= lo% AND pix% <= hi%
 THEN pix% = 1: ELSE pix% = 0
  430     PROCWritePixel(xx%, yy%, pix%)
  440   NEXT xx%
  450 NEXT yy%
  460 ENDPROC
```

WINDOWS

Listing 1

```
   10 REM WindSrc
   20 REM by Alan Blundell
   30 REM for Master Series only
   40 REM (C) BAU July 1990
   50 :
   60 MODE 7
   70 HIMEM=&7000
   80 PROCvars
   90 PRINT "Assembling ROM . . ."
  100 FOR pass=4 TO 6 STEP 2
  110 PRINT "Pass ";(pass-2)DIV2
  120 P%=&8000 : O%=&7000
  130 PROCromhead
  140 PROCwindows
  150 NEXT
  160 PRINT "Calculating checksums ";
  170 PROCchecksum("begin","comcheck")
  180 PROCchecksum("comcheck","clear")
  190 PROCchecksum("clear","open6")
  200 PROCchecksum("open6","calcstart")
  210 PROCchecksum("calcstart","colconv"
)
  220 PROCchecksum("colconv","restore")
  230 PROCchecksum("restore","bottomrigh
t")
  240 PRINT
  250 OSCLI ("SAVE WindRAM 7000 "+STR$~O
%+" 8000 8000")
  260 END
  270 :
  280 DEF PROCvars
  290 osbyte=&FFF4:oswrch=&FFEE
  300 osnewl=&FFE7:osasci=&FFE3
  310 gsread=&FFC5:gsinit=&FFC2
  320 osrdsc=&FFB9:oswrsc=&FFB3
  330 wrscptr=&D6
  340 oswordnumber=&EF
  350 oswordptr=&F0
  360 rdscptr=&F6
  370 REM VDU variables
  380 graphl=&300:graphb=&302
  390 graphr=&304:grapht=&306
  400 textl=&308:textb=&309
  410 textr=&30A:textt=&30B
  420 originX=&30C:originY=&30E
  430 cursorX=&310:cursorY=&312
  440 oldcursorX=&314:oldcursorY=&316
  450 Xpos=&318:Ypos=&319
  460 screenstart=&34E
```

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```
470 byteschar=&34F
480 TLHC=&350
490 bytesrow=&352
500 mode=&355
510 forecol=&357:backcol=&358
520 plotfore=&35B:plotback=&35C
530 gforecol=&36D:gbackcol=&36E
540 REM ZP usage
550 addr=&A8
560 temp=&AA
570 count=&AB
580 screen=&AC
590 mult=&AC
600 byte=&AE
610 repeat=&AF
620 ENDPROC
630 :
640 DEF PROCromhead
650 [OPT pass
660 .begin
670 EQUB 0
680 EQUW 0
690 JMP serviceentry
700 EQUB &82
710 EQUB (copyright-&8000)
720 EQUB 1
730 .title
740 EQUS "WINDOWS"
750 EQUB 0
760 EQUS "1.00"
770 .copyright EQUB 0
780 EQUS "(C)1988 Alan Blundell"
790 EQUB 0
800 \
810 .serviceentry
820 PHP
830 CMP #4
840 BEQ command
850 CMP #8
860 BEQ osword
870 CMP #9
880 BEQ help
890 CMP #39
900 BEQ reset
910 PLP
920 RTS
930 \
940 .command
950 JMP comcheck
960 \
970 .osword
980 JMP oswcheck
990 \
1000 .reset
1010 PHA
1020 PHX
1030 PHY
1040 JSR wclear
1050 JMP out
1060 \
1070 .help
1080 PHA
1090 PHX
1100 PHY
1110 CLD
1120 CLC
1130 JSR gsinit
1140 BEQ helptitle
1150 LDX #255
1160 .loop1
1170 INX
1180 LDA helpstring,X
1190 BEQ ourhelp
1200 JSR gsread
1210 ORA #32
1220 CMP helpstring,X
1230 BEQ loop1
1240 CMP #ASC"."
1250 BEQ ourhelp
1260 JMP out
1270 \
1280 .helpstring
1290 EQUS "windows"+CHR$0
1300 \
1310 .helptitle
1320 JSR print
1330 EQUB 13
1340 EQUS "WINDOWS 1.00"
1350 EQUB 13
1360 EQUS "  WINDOWS"
1370 EQUB 13
1380 NOP
1390 JMP out
1400 \
1410 .ourhelp
1420 JSR print
1430 EQUB 13
1440 EQUS "WINDOWS 1.00"+CHR$13+CHR$13
1450 EQUS "Use OSWORD 32 to set/clear a
window"+CHR$13
1460 EQUS "*WCLEAR clears any window da
ta stored."+CHR$13
1470 EQUS "   (- automatically cleared
on break.)"+CHR$13
1480 EQUS "*WFREE reports the remaining
 data space"+CHR$13
1490 EQUS "*WBACK makes the previous wi
ndow active"+CHR$13
1500 EQUS "*WFORE makes the next window
 active."+CHR$13
1510 NOP
1520 JMP outdone
1530 \
1540 .comcheck
1550 PHA
1560 PHX
1570 PHY
1580 CLD
1590 SEC
1600 JSR gsinit
1610 BNE gsok
1620 JMP out
1630 .gsok
1640 LDX #0
1650 JSR setjmp
1660 JSR gsread
1670 CMP #ASC"X"
1680 BEQ notprefix
1690 DEY
1700 .notprefix
1710 STY temp
1720 .loop2
1730 JSR gsread
1740 CMP #ASC"."
1750 BEQ gotcom
1760 ORA #32
1770 CMP commands,X
1780 BNE nextcom
1790 INX
1800 LDA commands,X
1810 BMI gotcom
1820 BPL loop2
1830 .nextcom
1840 INX
1850 LDA commands,X
1860 BPL nextcom
1870 JSR setjmp
1880 LDY temp
1890 LDA commands,X
1900 CMP #&FF
1910 BNE loop2
1920 JMP out
1930 .gotcom
1940 STY temp
1950 JMP (addr)
1960 \
1970 .setjmp
1980 LDA commands,X
1990 STA addr+1
2000 INX
2010 LDA commands,X
2020 STA addr
2030 INX
2040 RTS
2050 \
2060 .oswcheck
2070 PHA
2080 PHX
2090 PHY
2100 LDA oswordnumber
2110 CMP #32
2120 BNE out
2130 LDY #0
2140 LDA (oswordptr),Y
2150 CMP #10
2160 BCS out
2170 ASL A
2180 TAY
2190 LDA ostable,Y
2200 STA addr
2210 INY
2220 LDA ostable,Y
2230 STA addr+1
2240 JSR getcoords
2250 JMP (addr)
2260 \
2270 .ostable
2280 EQUW closeall
2290 EQUW close
2300 EQUW release
2310 EQUW open3
2320 EQUW open4
2330 EQUW open5
2340 EQUW open6
2350 EQUW open7
2360 EQUW open8
2370 EQUW open9
2380 \
2390 .out
2400 PLY
2410 PLX
2420 PLA
2430 PLP
2440 RTS
2450 \
2460 .outdone
2470 PLY
2480 PLX
2490 PLA
2500 LDA #0
2510 PLP
2520 RTS
2530 \
2540 .errors
2550 PLA
2560 STA addr
2570 PLA
2580 STA addr+1
2590 LDY #1
2600 .loop3
2610 LDA (addr),Y
2620 BEQ skip1
2630 STA &101,Y
2640 INY
2650 BNE loop3
2660 .skip1
2670 STA &101,Y
2680 STA &100
2690 STX &101
2700 JMP &100
2710 \
2720 .print
2730 STY temp
2740 PLA
2750 STA addr
2760 PLA
2770 STA addr+1
2780 LDY #0
2790 .loop4
2800 INC addr
2810 BNE skip2
2820 INC addr+1
2830 .skip2
2840 LDA (addr),Y
2850 CMP #&EA
2860 BEQ endtext
2870 JSR osasci
2880 BIT &FF
2890 BMI esc
2900 JMP loop4
2910 .endtext
2920 LDY temp
2930 JMP (addr)
2940 \
2950 .esc
2960 LDA #126
2970 JSR osbyte
2980 JSR osnewl
2990 LDX #17
3000 JSR errors
3010 EQUS "Escape"
3020 BRK
3030 \
3040 .hexout
3050 PHA
3060 LSR A
3070 LSR A
3080 LSR A
3090 LSR A
3100 JSR pchar
3110 PLA
3120 .pchar
3130 AND #&0F
3140 CLC
3150 ADC #ASC"0"
3160 CMP #ASC"9"+1
3170 BCC skip3
3180 ADC #6
3190 .skip3
3200 JMP oswrch
3210 \
3220 .commands
3230 EQUB clear DIV256
3240 EQUB clear MOD256
3250 EQUS "wclear"
3260 EQUB free DIV256
3270 EQUB free MOD256
3280 EQUS "wfree"
3290 EQUB wback DIV256
3300 EQUB wback MOD256
3310 EQUS "wback"
3320 EQUB wfore DIV256
3330 EQUB wfore MOD256
3340 EQUS "wfore"
3350 EQUD &FFFFFFFF
3360 ]
3370 ENDPROC
3380 :
3390 DEF PROCwindows
3400 [OPT pass
3410 \
3420 .clear
3430 JSR wclear
3440 JMP outdone
3450 \
3460 .wclear
3470 LDA #data MOD256
3480 STA ptrlo
3490 STA activelo
3500 LDA #data DIV256
3510 STA ptrhi
3520 STA activehi
3530 RTS
3540 \
3550 .free
3560 JSR osnewl
3570 LDA #ASC"&"
3580 JSR oswrch
3590 SEC
3600 LDA #&FF
3610 SBC ptrlo
3620 PHA
3630 LDA #&BF
3640 SBC ptrhi
3650 JSR hexout
3660 PLA
3670 JSR hexout
3680 JSR print
3690 EQUS " bytes free for window data"
+CHR$13
3700 NOP
3710 JMP outdone
3720 \
3730 .wback
3740 LDA activelo
3750 CMP #data MOD256
3760 BNE skip4
3770 LDA activehi
3780 CMP #data DIV256
3790 BNE skip4
3800 LDX #64
3810 JSR errors
3820 EQUS "No window active"
3830 BRK
3840 .skip4
3850 JSR activetoaddr
3860 JSR pointblock
3870 JSR storeheader
3880 JSR moveback
3890 JSR pointblock
3900 JSR restore
3910 LDA #&2E
3920 JSR incaddr
3930 JSR setactive
3940 JMP outdone
3950 \
3960 .wfore
3970 JSR checkptr
3980 LDA ptrlo
3990 CMP activelo
4000 BNE skip5
4010 LDA ptrhi
4020 CMP activehi
4030 BNE skip5
4040 LDX #65
4050 JSR errors
4060 EQUS "Last window already active"
4070 BRK
4080 .skip5
4090 JSR ptrtoaddr
4100 .loop5
4110 JSR pointblock
4120 LDY #&2C
4130 LDA (addr),Y
4140 CMP activelo
4150 BNE skip6
4160 INY
4170 LDA (addr),Y
4180 CMP activehi
4190 BEQ skip7
4200 .skip6
4210 JSR moveback
4220 JMP loop5
4230 .skip7
4240 LDA addr
4250 PHA
4260 LDA addr+1
4270 PHA
4280 JSR moveback
4290 JSR pointblock
4300 JSR storeheader
4310 PLA
4320 STA addr+1
4330 PLA
4340 STA addr
4350 JSR restore
4360 LDA #&2E
4370 JSR incaddr
4380 JSR setactive
4390 JMP outdone
4400 \
4410 .release
4420 JSR checkptr
4430 JSR ptrtoaddr
4440 JSR pointblock
4450 JSR moveback
4460 JSR setptr
4470 JSR checkactive
4480 JMP outdone
4490 \
4500 .closeall
4510 LDA ptrlo
4520 CMP #data MOD256
4530 BNE skip8
4540 LDA ptrhi
4550 CMP #data DIV256
4560 BNE skip8
4570 JMP outdone
4580 .skip8
4590 JSR closewindow
4600 JMP closeall
4610 \
4620 .close
4630 JSR checkptr
```

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WINDOWS

◀ Continued

```
4640 JSR closewindow
4650 JMP outdone
4660 \
4670 .closewindow
4680 JSR ptrtoaddr
4690 JSR pointblock
4700 JSR moveback
4710 JSR pointblock
4720 JSR restore
4730 LDA #&2E
4740 JSR incaddr
4750 JSR setptr
4760 JSR checkactive
4770 LDY #0
4780 .loop6
4790 LDA (addr),Y
4800 STA coords,Y
4810 INY
4820 CPY #4
4830 BCC loop6
4840 LDA #4
4850 JSR incaddr
4860 JSR calcstart
4870 LDY #0
4880 STY repeat
4890 .rows
4900 LDA left
4910 STA count
4920 LDA screen
4930 STA wrscptr
4940 LDA screen+1
4950 STA wrscptr+1
4960 .cols
4970 LDX byteschar
4980 .chars
4990 JSR unpack
5000 JSR oswrsc
5010 INC wrscptr
5020 BNE skip9
5030 INC wrscptr+1
5040 .skip9
5050 DEX
5060 BNE chars
5070 INC count
5080 LDA count
5090 CMP right
5100 BNE cols
5110 JSR nextrow
5120 INC top
5130 LDA top
5140 CMP bottom
5150 BNE rows
5160 RTS
5170 \
5180 .open6
5190 JSR square
5200 JMP open67
5210 \
5220 .open7
5230 JSR round
5240 JMP open67
5250 \
5260 .open8
5270 JSR square
5280 JMP open89
5290 \
5300 .open9
5310 JSR round
5320 JMP open89
5330 \
5340 .open89
5350 JSR checkmode
5360 LDA top
5370 SEC
5380 SBC #3
5390 BMI open6789out
5400 STA top
5410 JSR setframe
5420 LDA #166
5430 JSR doline
5440 LDA topright
5450 JSR oswrch
5460 LDA #169
5470 JSR oswrch
5480 LDY #7
5490 JSR setcols
5500 LDX left
5510 INX
5520 JSR ptitle
5530 CPX right
5540 BCS skip10
5550 LDA #32
5560 JSR doline
5570 .skip10
5580 LDY #9
5590 JSR setcols
5600 LDA #169
5610 JSR oswrch
5620 LDX left
5630 LDA #171
5640 JSR oswrch
5650 INX
5660 LDA #166
5670 JSR doline
5680 LDA #173
5690 JSR oswrch
5700 LDY top
5710 INY
5720 INY
5730 INY
5740 JMP doframe
5750 \
5760 .open6789out
5770 JSR getcoords
5780 JMP open5
5790 \
5800 .open67
5810 JSR checkmode
5820 DEC top
5830 BMI open6789out
5840 JSR setframe
5850 LDY #7
5860 JSR setcols
5870 LDX left
5880 INX
5890 JSR ptitle
5900 LDY #9
5910 JSR setcols
5920 CPX right
5930 BCS skip11
5940 LDA #166
5950 JSR doline
5960 .skip11
5970 LDA topright
5980 JSR oswrch
5990 LDY top
6000 INY
6010 JMP doframe
6020 \
6030 .setframe
6040 DEC left
6050 BMI open6789out
6060 LDY mode
6070 INC right
6080 LDA right
6090 CMP colstable,Y
6100 BCS open6789out
6110 INC bottom
6120 LDA bottom
6130 CMP rowstable,Y
6140 BCS open6789out
6150 JSR ptrtoaddr
6160 JSR pointblock
6170 JSR storeheader
6180 JSR ptrtoaddr
6190 JSR storesc
6200 JSR setwind
6210 LDY #9
6220 JSR setcols
6230 LDA #12
6240 JSR oswrch
6250 LDA topleft
6260 JSR oswrch
6270 LDX left
6280 INX
6290 RTS
6300 \
6310 .doframe
6320 LDX left
6330 LDA #169
6340 JSR oswrch
6350 LDA #32
6360 INX
6370 JSR doline
6380 LDA #169
6390 JSR oswrch
6400 INY
6410 CPY bottom
6420 BCC doframe
6430 LDA bottomleft
6440 JSR oswrch
6450 LDX left
6460 INX
6470 LDA #166
6480 JSR doline
6490 LDX Xpos
6500 LDY Ypos
6510 LDA #26
6520 JSR oswrch
6530 LDA #31
6540 JSR oswrch
6550 TXA
6560 JSR oswrch
6570 TYA
6580 JSR oswrch
6590 LDA bottomright
6600 JSR oswrch
6610 JSR getcoords
6620 JSR setwind
6630 LDY #5
6640 JSR setcols
6650 LDA #12
6660 JSR oswrch
6670 JSR storeheader
6680 JSR setptractive
6690 JMP outdone
6700 \
6710 .open5
6720 JSR checkmode
6730 DEC top
6740 BPL skip12
6750 INC top
6760 JMP open4
6770 .skip12
6780 JSR ptrtoaddr
6790 JSR pointblock
6800 JSR storeheader
6810 JSR ptrtoaddr
6820 JSR storesc
6830 JSR setwind
6840 LDY #7
6850 JSR setcols
6860 LDX left
6870 JSR ptitle
6880 DEX
6890 LDA #32
6900 JSR doline
6910 INC top
6920 JSR setwind
6930 LDY #5
6940 JSR setcols
6950 LDA #12
6960 JSR oswrch
6970 JSR storeheader
6980 JSR setptractive
6990 JMP outdone
7000 \
7010 .open4
7020 JSR open
7030 LDY #5
7040 JSR setcols
7050 LDA #12
7060 JSR oswrch
7070 JMP outdone
7080 \
7090 .open3
7100 JSR open
7110 JMP outdone
7120 \
7130 .open
7140 JSR ptrtoaddr
7150 JSR pointblock
7160 JSR storeheader
7170 JSR ptrtoaddr
7180 JSR storesc
7190 JSR storeheader
7200 JSR setptractive
7210 JMP setwind
7220 \
7230 .calcstart
7240 INC bottom
7250 INC right
7260 LDA TLHC
7270 STA screen
7280 LDA TLHC+1
7290 STA screen+1
7300 LDY top
7310 BEQ skip13
7320 .loop7
7330 LDA screen
7340 CLC
7350 ADC bytesrow
7360 STA screen
7370 LDA screen+1
7380 ADC bytesrow+1
7390 STA screen+1
7400 DEY
7410 BNE loop7
7420 .skip13
7430 LDY left
7440 BEQ skip14
7450 .loop8
7460 LDA screen
7470 CLC
7480 ADC byteschar
7490 STA screen
7500 LDA screen+1
7510 ADC #0
7520 STA screen+1
7530 DEY
7540 BNE loop8
7550 .skip14
7560 RTS
7570 \
7580 .storesc
7590 JSR chkedge
7600 LDY #0
7610 .loop9
7620 LDA coords,Y
7630 STA (addr),Y
7640 INY
7650 CPY #4
7660 BCC loop9
7670 LDA #4
7680 JSR incaddr
7690 LDA top
7700 PHA
7710 JSR calcstart
7720 LDA screen
7730 STA rdscptr
7740 LDA screen+1
7750 STA rdscptr+1
7760 LDY #0
7770 JSR osrdsc
7780 STA byte
7790 LDA #1
7800 STA repeat
7810 INC rdscptr
7820 BNE skip15
7830 INC rdscptr+1
7840 .skip15
7850 LDA left
7860 STA count
7870 LDX byteschar
7880 DEX
7890 BNE chars2
7900 .rows2
7910 LDA left
7920 STA count
7930 LDA screen
7940 STA rdscptr
7950 LDA screen+1
7960 STA rdscptr+1
7970 .cols2
7980 LDX byteschar
7990 .chars2
8000 STX temp
8010 JSR osrdsc
8020 LDX temp
8030 CMP byte
8040 BEQ samebyte
8050 PHA
8060 JSR pack
8070 PLA
8080 STA byte
8090 INC repeat
8100 BNE stored
8110 .samebyte
8120 LDA repeat
8130 CMP #255
8140 BNE skip16
8150 JSR pack
8160 .skip16
8170 INC repeat
8180 .stored
8190 INC rdscptr
8200 BNE skip17
8210 INC rdscptr+1
8220 .skip17
8230 DEX
8240 BNE chars2
8250 INC count
8260 LDA count
8270 CMP right
8280 BNE cols2
8290 JSR nextrow
8300 INC top
8310 LDA top
8320 CMP bottom
8330 BNE rows2
8340 JSR pack
8350 DEC bottom
8360 DEC right
8370 PLA
8380 STA top
8390 RTS
8400 \
8410 .storeheader
8420 LDY #0
8430 LDA #28
8440 JSR put
8450 LDA textl
8460 LDX textb
8470 JSR put2
8480 LDA textr
8490 LDX textt
8500 JSR put2
8510 LDA #17
8520 JSR put
8530 LDA forecol
8540 JSR colconv
8550 JSR put
8560 PHA
8570 LDA #17
8580 JSR put
8590 LDA backcol
8600 JSR colconv
8610 ORA #&80
8620 JSR put
8630 LDA #17
8640 JSR oswrch
8650 PLA
8660 JSR oswrch
8670 LDA #31
8680 JSR put
8690 LDA Xpos
8700 SEC
8710 SBC textl
8720 JSR put
8730 LDA Ypos
8740 SEC
8750 SBC textt
8760 JSR put
8770 LDA #29
8780 JSR put
8790 LDA originX
8800 LDX originX+1
8810 JSR put2
8820 LDA originY
8830 LDX originY+1
8840 JSR put2
8850 LDA #24
8860 JSR put
8870 LDA byteschar
```

Continued ▶

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```
8880 LSR A
8890 LSR A
8900 LSR A
8910 STA count
8920 LDA graphl
8930 LDX graphl+1
8940 JSR setX
8950 LDA graphb
8960 LDX graphb+1
8970 JSR setY
8980 LDA graphr
8990 LDX graphr+1
9000 JSR setX
9010 LDA grapht
9020 LDX grapht+1
9030 JSR setY
9040 LDA #18
9050 JSR put
9060 LDA plotfore
9070 JSR put
9080 LDA gforecol
9090 JSR put
9100 LDA #18
9110 JSR put
9120 LDA plotback
9130 JSR put
9140 LDA gbackcol
9150 ORA #&80
9160 JSR put
9170 LDA #25
9180 LDX #4
9190 JSR put2
9200 LDA oldcursorX
9210 LDX oldcursorX+1
9220 JSR setX
9230 LDA oldcursorY
9240 LDX oldcursorY+1
9250 JSR setY
9260 LDA #25
9270 LDX #4
9280 JSR put2
9290 LDA cursorX
9300 LDX cursorX+1
9310 JSR put2
9320 LDA cursorY
9330 LDX cursorY+1
9340 JSR put2
9350 RTS
9360 \
9370 .colconv
9380 STA temp
9390 LDX #255
9400 .loop10
9410 LDA #17
9420 JSR oswrch
9430 INX
9440 TXA
9450 JSR oswrch
9460 LDA temp
9470 CMP forecol
9480 BNE loop10
9490 TXA
9500 RTS
9510 \
9520 .put
9530 STA (addr),Y
9540 INY
9550 RTS
9560 \
9570 .put2
9580 STA (addr),Y
9590 INY
9600 TXA
9610 STA (addr),Y
9620 INY
9630 RTS
9640 \
9650 .setX
9660 STA mult
9670 STX mult+1
9680 LDA count
9690 .loop11
9700 ASL mult
9710 ROL mult+1
9720 LSR A
9730 BNE loop11
9740 LDA mult
9750 SEC
9760 SBC originX
9770 STA mult
9780 LDA mult+1
9790 SBC originX+1
9800 TAX
9810 LDA mult
9820 JSR put2
9830 RTS
9840 \
9850 .setY
9860 STX mult+1
9870 ASL A
9880 ROL mult+1
9890 ASL A
9900 ROL mult+1
9910 SEC
9920 SBC originY
9930 STA mult
9940 LDA mult+1
9950 SBC originY+1
9960 TAX
9970 LDA mult
9980 JSR put2
9990 RTS
10000 \
10010 .setwind
10020 LDA #28
10030 JSR oswrch
10040 LDY #0
10050 .loop12
10060 LDA coords,Y
10070 JSR oswrch
10080 INY
10090 CPY #4
10100 BNE loop12
10110 LDA #29
10120 JSR oswrch
10130 LDA left
10140 JSR convX
10150 LDA bottom
10160 CLC
10170 ADC #1
10180 JSR convY
10190 JSR invert
10200 JSR multwrch
10210 LDA #24
10220 JSR oswrch
10230 LDA #0
10240 JSR oswrch
10250 JSR oswrch
10260 JSR oswrch
10270 JSR oswrch
10280 LDA right
10290 SEC
10300 SBC left
10310 CLC
10320 ADC #1
10330 JSR convX
10340 LDA bottom
10350 SEC
10360 SBC top
10370 CLC
10380 ADC #1
10390 JSR convY
10400 JSR multwrch
10410 LDY #255
10420 .moves
10430 LDA #25
10440 JSR oswrch
10450 LDA #4
10460 JSR oswrch
10470 LDA #0
10480 JSR oswrch
10490 JSR oswrch
10500 JSR oswrch
10510 JSR oswrch
10520 INY
10530 BEQ moves
10540 RTS
10550 \
10560 .convX
10570 CLC
10580 LDY #0
10590 STY mult
10600 LDY byteschar
10610 STY count
10620 .loop13
10630 ASL A
10640 ROL mult
10650 LSR count
10660 BNE loop13
10670 JSR oswrch
10680 LDA mult
10690 JMP oswrch
10700 \
10710 .convY
10720 CLC
10730 LDY #0
10740 STY mult+1
10750 ASL A
10760 ROL mult+1
10770 ASL A
10780 ROL mult+1
10790 ASL A
10800 ROL mult+1
10810 ASL A
10820 ROL mult+1
10830 ASL A
10840 ROL mult+1
10850 STA mult
10860 RTS
10870 \
10880 .invert
10890 LDA #1024 MOD256
10900 SEC
10910 SBC mult
10920 STA mult
10930 LDA #1024 DIV256
10940 SBC mult+1
10950 STA mult+1
10960 RTS
10970 \
10980 .multwrch
10990 LDA mult
11000 JSR oswrch
11010 LDA mult+1
11020 JMP oswrch
11030 \
11040 .setcols
11050 LDA #17
11060 JSR oswrch
11070 LDA (oswordptr),Y
11080 JSR oswrch
11090 LDA #17
11100 JSR oswrch
11110 INY
11120 LDA (oswordptr),Y
11130 ORA #&80
11140 JSR oswrch
11150 LDA #18
11160 JSR oswrch
11170 LDA #0
11180 JSR oswrch
11190 DEY
11200 LDA (oswordptr),Y
11210 JSR oswrch
11220 LDA #18
11230 JSR oswrch
11240 LDA #0
11250 JSR oswrch
11260 INY
11270 LDA (oswordptr),Y
11280 ORA #&80
11290 JMP oswrch
11300 \
11310 .pack
11320 LDA repeat
11330 STA (addr),Y
11340 INY
11350 LDA byte
11360 STA (addr),Y
11370 DEY
11380 LDA #2
11390 JSR incaddr
11400 LDA addr+1
11410 CMP #&BF
11420 BCC stillfree
11430 LDA addr
11440 CMP #&BF    \&FF-&2E-2 for 2 more
bytes
11450 BCC stillfree
11460 LDX #66
11470 JSR errors
11480 EQUS "No memory for window data"
11490 BRK
11500 .stillfree
11510 LDA #0
11520 STA repeat
11530 RTS
11540 \
11550 .unpack
11560 LDA repeat
11570 BNE skip18
11580 LDA (addr),Y
11590 STA repeat
11600 INY
11610 LDA (addr),Y
11620 STA byte
11630 DEY
11640 LDA #2
11650 JSR incaddr
11660 .skip18
11670 DEC repeat
11680 LDA byte
11690 RTS
11700 \
11710 .nextrow
11720 LDA screen
11730 CLC
11740 ADC bytesrow
11750 STA screen
11760 LDA screen+1
11770 ADC bytesrow+1
11780 CMP #&80
11790 BCC skip19
11800 AND #&7F
11810 CLC
11820 ADC screenstart
11830 .skip19
11840 STA screen+1
11850 RTS
11860 \
11870 .incaddr
11880 CLC
11890 ADC addr
11900 STA addr
11910 LDA addr+1
11920 ADC #0
11930 STA addr+1
11940 RTS
11950 \
11960 .restore
11970 LDY #0
11980 .loop14
11990 LDA (addr),Y
12000 JSR oswrch
12010 INY
12020 CPY #&2C
12030 BCC loop14
12040 RTS
12050 \
12060 .getcoords
12070 LDY #1
12080 .loop15
12090 LDA (oswordptr),Y
12100 STA coords-1,Y
12110 INY
12120 CPY #5
12130 BNE loop15
12140 RTS
12150 \
12160 .checkptr
12170 LDA ptrlo
12180 CMP #data MOD256
12190 BNE skip20
12200 LDA ptrhi
12210 CMP #data DIV256
12220 BNE skip20
12230 LDX #67
12240 JSR errors
12250 EQUS "No window open"
12260 BRK
12270 .skip20
12280 RTS
12290 \
12300 .ptrtoaddr
12310 LDA ptrlo
12320 STA addr
12330 LDA ptrhi
12340 STA addr+1
12350 RTS
12360 \
12370 .activetoaddr
12380 LDA activelo
12390 STA addr
12400 LDA activehi
12410 STA addr+1
12420 RTS
12430 \
12440 .setptractive
12450 LDA ptrlo
12460 STA (addr),Y
12470 INY
12480 LDA ptrhi
12490 STA (addr),Y
12500 LDA #&2E
12510 JSR incaddr
12520 JSR setactive
12530 JMP setptr
12540 \
12550 .checkactive
12560 LDA ptrhi
12570 CMP activehi
12580 BEQ locheck
12590 BCC change
12600 .nochange
12610 RTS
12620 .locheck
12630 LDA ptrlo
12640 CMP activelo
12650 BCS nochange
12660 .change
12670 JMP setactive
12680 \
12690 .pointblock
12700 LDA addr
12710 SEC
12720 SBC #&2E
12730 STA addr
12740 LDA addr+1
12750 SBC #0
12760 STA addr+1
12770 RTS
12780 \
12790 .setactive
12800 LDA addr
12810 STA activelo
12820 LDA addr+1
12830 STA activehi
12840 RTS
12850 \
12860 .setptr
12870 LDA addr
12880 STA ptrlo
12890 LDA addr+1
12900 STA ptrhi
12910 RTS
12920 \
12930 .moveback
12940 LDY #&2C
12950 LDA (addr),Y
12960 PHA
12970 INY
12980 LDA (addr),Y
12990 STA addr+1
13000 PLA
13010 STA addr
13020 RTS
13030 \
13040 .square
13050 LDA #163
13060 STA topleft
13070 LDA #165
13080 STA topright
13090 LDA #170
13100 STA bottomleft
```

Continued ▶

WINDOWS

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```
13110 LDA #172
13120 STA bottomright
13130 RTS
13140 \
13150 .round
13160 LDA #176
13170 STA topleft
13180 LDA #177
13190 STA topright
13200 LDA #178
13210 STA bottomleft
13220 LDA #179
13230 STA bottomright
13240 RTS
13250 \
13260 .ptitle
13270 LDY #11
13280 .loop16
13290 LDA (oswordptr),Y
13300 CMP #32
13310 BCC skip21
13320 JSR oswrch
13330 INY
13340 INX
13350 CPX right
13360 BCC loop16
13370 .skip21
13380 RTS
13390 \
13400 .doline
13410 JSR oswrch
13420 INX
13430 CPX right
13440 BCC doline
13450 RTS
13460 \
13470 .checkmode
13480 LDA mode
13490 CMP #7
13500 BCC modeok
13510 LDX #68
13520 JSR errors
13530 EQUS "Not suitable for teletext"
13540 BRK
13550 .modeok
13560 RTS
13570 \
13580 .chkedge
13590 LDA right
13600 CMP left
13610 BCC chkerr
13620 LDY mode
13630 CMP colstable,Y
13640 BCS chkerr
13650 LDA bottom
13660 CMP top
13670 BCC chkerr
13680 CMP rowstable,Y
13690 BCS chkerr
13700 RTS
13710 .chkerr
13720 LDX #69
13730 JSR errors
13740 EQUS "Parameters"
13750 BRK
13760 \
13770 .colstable
13780 EQUB 80
13790 EQUB 40
13800 EQUB 20
13810 EQUB 80
13820 EQUB 40
13830 EQUB 20
13840 EQUB 40
13850 EQUB 40
13860 \
13870 .rowstable
13880 EQUB 32
13890 EQUB 32
13900 EQUB 32
13910 EQUB 25
13920 EQUB 32
13930 EQUB 32
13940 EQUB 25
13950 EQUB 25
13960 \
13970 \Variables held in swr
13980 .ptrlo EQUB data MOD256
13990 .ptrhi EQUB data DIV256
14000 .activelo EQUB data MOD256
14010 .activehi EQUB data DIV256
14020 .coords
14030 .left   EQUB 0
14040 .bottom EQUB 0
14050 .right  EQUB 0
14060 .top    EQUB 0
14070 .topleft EQUB 0
14080 .topright EQUB 0
14090 .bottomleft EQUB 0
14100 .bottomright EQUB 0
14110 ]
14120 data=P%+&2E
14130 ENDPROC
14140 :
14150 DEF PROCchecksum(start$,end$)
14160 start%=EVAL(start$)-(P%-O%)
14170 end%=EVAL(end$)-1-(P%-O%)
14180 sum%=0
14190 FOR loop%=start% TO end%
14200 sum%=sum%+?loop%
14210 NEXT
14220 READ check%
14230 IF check%<>sum% PRINT '"Checksum e
rror between .";start$;" and .";end$:END
 ELSE PRINT ". ";
14240 ENDPROC
14250 :
14260 DATA 36132,37738,48883,53676,49200
,61738,42687
```

Listing 2

```
  10 REM Windows Demonstration
  20 REM By Alan Blundell
  30 REM For Master Series with WindRAM
  40 REM (C) BAU July 1990
  50 :
  60 MODE 1
  70 PROCinit
  80 PROCcursor(0)
  90 FOR loop%=10 TO 1 STEP -1
 100 GCOL 0,loop%MOD4
 110 MOVE 0,loop%*100
 120 MOVE loop%*128,0
 130 PLOT 85,1280,1024
 140 NEXT
 150 REPEAT
 160 PROCtitle("BAU Windows")
 170 PROCcolours(0,3,0,1,2,0)
 180 PROCwindow(9,2,11,26,4)
 190 PRINT '"A sideways RAM utility"'
 200 PROCprint("Some key features are:"
)
 210 PROCcolours(2,0,1,0,3,0)
 220 PROCwindow(6,8,27,37,10)
 230 PRINT
 240 PROCprint("- works in any MODE")
 250 PROCprint("- windows for text + gr
aphics")
 260 PRINT "- switch between multiple"
 270 PROCprint("  active windows")
 280 PROCprint("- works with scrolled s
creens")
 290 PROCprint("- works with shadow scr
eens")
 300 PROCprint("- compresses stored dat
a")
 310 PROCprint("- accessible by OSWORD
call")
 320 PRINT "- takes up no user RAM";
 330 PROCpause(5)
 340 *WBACK
 350 PROCprint("Simple to use . .")
 360 PROCcolours(3,0,0,2,0,3)
 370 PROCwindow(5,0,29,39,18)
 380 PROCprint(">*HELP WINDOWS")
 390 *HELP WINDOWS
 400 PROCpause(8)
 410 PROCcloseall
 420 PROCcolours(0,3,2,0,1,0)
 430 PROCwindow(6,11,3,29,1)
 440 PRINT '"7 styles available:";
 450 PROCwindow(3,0,15,16,5)
 460 PRINT"Style 3"
 470 PRINT '"(this window has"
 480 PRINT '"been opened"
 490 PRINT '"but has not"
 500 PRINT '"been cleared)"
 510 PROCpause(3)
 520 FOR style=4 TO 9
 530 L=(style-3)*3
 540 R=L+9+RND(8)
 550 T=(style*2)-1-((style-7)*(style>7)
)
 560 B=T+10
 570 PROCwindow(style,L,B,R,T)
 580 PROCprint("Style "+STR$style)
 590 NEXT
 600 PROCpause(3)
 610 PROCcloseall
 620 PROCwindow(6,1,3,28,1)
 630 PRINT '"Switch between windows . .
";
 640 PROCtitle("Two active windows!")
 650 PROCcolours(0,2,3,0,1,0)
 660 PROCwindow(7,1,30,18,10)
 670 PROCcolours(3,0,0,3,0,2)
 680 PROCwindow(9,20,26,38,6)
 690 step=0
 700 PROCtwin(4,250,350)
 710 FOR loop=0 TO 10*PI STEP PI/50
 720 xcoord=250+((110+step)*COS(loop+41
))*SIN(loop*3)
 730 ycoord=350+((80+step)*SIN(loop+34)
)*SIN(loop*4)
 740 PROCtwin(5,xcoord,ycoord)
 750 step=step+0.4
 760 NEXT
 770 PROCpause(5)
 780 PROCcloseall
 790 PROCcolours(0,3,0,0,0,0)
 800 PROCwindow(4,0,9,35,1)
 810 PROCprint("Room for plenty of wind
ows")
 820 PRINT ">*WFREE"
 830 *WFREE
 840 PRINT
 850 PROCpause(3)
 860 PROCprint(">PROCwindow(4,5,20,39,9
)")
 870 PROCcolours(2,0,0,0,0,0)
 880 PROCwindow(4,5,20,39,9)
 890 PROCpause(1)
 900 PRINT ">*WFREE"
 910 *WFREE
 920 PROCpause(2)
 930 PROCcolours(0,1,0,0,0,0)
 940 PROCwindow(4,10,23,39,13)
 950 PROCpause(2)
 960 PROCprint("Of course, windows can
overlap")
 970 PROCcolours(1,0,0,0,0,0)
 980 PROCwindow(4,20,22,36,15)
 990 PROCprint(">*WFREE")
1000 *WFREE
1010 PROCpause(2)
1020 PROCcolours(3,0,0,2,0,2)
1030 PROCtitle("BAU Windows")
1040 PROCwindow(8,4,29,21,27)
1050 PROCcursor(1)
1060 PRINT '" Press a key . ";
1070 IF INKEY(500)>0 PROCfinish
1080 PROCcursor(0)
1090 PROCcloseall
1100 UNTIL 0
1110 :
1120 DEF PROCfinish
1130 PROCcursor(0)
1140 PRINT ''"   End of demo."
1150 PROCrelease
1160 PROCcloseall
1170 PROCcursor(1)
1180 END
1190 :
1200 DEF PROCinit
1210 REM Set block% to 12+(max length o
f title$)
1220 DIM block% 32
1230 A%=32
1240 X%=block%
1250 Y%=block%DIV256
1260 block%?11=&0D
1270 osword=&FFF1
1280 *WCLEAR
1290 ENDPROC
1300 :
1310 DEF PROCtitle(title$)
1320 $(block%+11)=title$
1330 ENDPROC
1340 :
1350 DEF PROCcolours(fore%,back%,barcol
%,barback%,edgecol%,edgeback%)
1360 block%?5=fore%
1370 block%?6=back%
1380 block%?7=barcol%
1390 block%?8=barback%
1400 block%?9=edgecol%
1410 block%?10=edgeback%
1420 ENDPROC
1430 :
1440 DEF PROCwindow(action%,left%,botto
m%,right%,top%)
1450 block%?0=action%
1460 block%?1=left%
1470 block%?2=bottom%
1480 block%?3=right%
1490 block%?4=top%
1500 CALL osword
1510 ENDPROC
1520 :
1530 DEF PROCcloseall
1540 block%?0=0
1550 CALL osword
1560 ENDPROC
1570 :
1580 DEF PROCclose
1590 block%?0=1
1600 CALL osword
1610 ENDPROC
1620 :
1630 DEF PROCrelease
1640 block%?0=2
1650 CALL osword
1660 ENDPROC
1670 :
1680 DEF PROCpause(seconds%)
1690 IF INKEY(seconds%*100)
1700 ENDPROC
1710 :
1720 DEF PROCprint(text$)
1730 PRINT text$'
1740 PROCpause(2)
1750 ENDPROC
1760 :
1770 DEF PROCcursor(on%)
1780 VDU 23,1,on%;0;0;0;
1790 ENDPROC
1800 :
1810 DEF PROCtwin(a%,x%,y%)
1820 VDU25,a%,x%;y%;
1830 *WBACK
1840 VDU25,a%,x%;y%;
1850 *WFORE
1860 ENDPROC
```

Listing 3

```
  10 REM Windows - Listing 3
  20 REM BASIC PROCedures
  30 REM by Alan Blundell
  40 REM for Master Series only
  50 REM (C) BAU July 1990
  60 :
  70 DEF PROCinit
  80 REM Set block% to 12+(max length o
f title$)
  90 DIM block% 32
 100 A%=32
 110 X%=block%
 120 Y%=block%DIV256
 130 block%?11=&0D
 140 osword=&FFF1
 150 *WCLEAR
 160 ENDPROC
 170 :
 180 DEF PROCtitle(title$)
 190 $(block%+11)=title$
 200 ENDPROC
 210 :
 220 DEF PROCcolours(fore%,back%,barcol
%,barback%,edgecol%,edgeback%)
 230 block%?5=fore%
 240 block%?6=back%
 250 block%?7=barcol%
 260 block%?8=barback%
 270 block%?9=edgecol%
 280 block%?10=edgeback%
 290 ENDPROC
 300 :
 310 DEF PROCwindow(action%,left%,botto
m%,right%,top%)
 320 block%?0=action%
 330 block%?1=left%
 340 block%?2=bottom%
 350 block%?3=right%
 360 block%?4=top%
 370 CALL osword
 380 ENDPROC
 390 :
 400 DEF PROCcloseall
 410 block%?0=0
 420 CALL osword
 430 ENDPROC
 440 :
 450 DEF PROCclose
 460 block%?0=1
 470 CALL osword
 480 ENDPROC
 490 :
 500 DEF PROCrelease
 510 block%?0=2
 520 CALL osword
 530 ENDPROC
```

CHARACTER UTILITY

Listing 1

```
10 REM Crazy Characters!
20 REM by Tim Campen
30 REM for B/B+/M/C (with SWR)
40 REM (c) BAU July 1990
50 :
60 MODE 7
70 LOMEM=&6600
80 osnewl=&FFE7
90 osbyte=&FFF4
100 oswrch=&FFEE
110 osword=&FFF1
120 osasci=&FFE3
130 oscli=&FFF7
140 patch=&900
150 diff%=&2500
160 comline=&F2
170 INPUT'"Is this to run on a BBC Mas
ter (Y/N) ";A$
180 IF A$="Y" OR A$="y" THEN fxcode=0
ELSE fxcode=6
190 FOR pass=0 TO 2 STEP2
200 P%=&5B00
210 [
220 OPT pass
230 EQUB0
240 EQUB75
250 EQUB66
260 JMP serve+diff%
270 EQUB&82
280 EQUB copyright MOD256
290 EQUB1
300 .title
310 EQUS"Crazy Characters!"
320 EQUB0
330 .copyright
340 EQUB0
350 EQUS"(C) BAU Tim Campen"
360 EQUB0
370 .serve
380 PHA
390 STA temp+diff%
400 TXA
410 PHA
420 TYA
430 PHA
440 LDX#255
450 .inloop
460 INX
470 LDA&70,X
480 STA zero+diff%,X
490 CPX#10
500 BCS nobuf
510 LDA patch,X
520 STA buffer+diff%,X
530 .nobuf
540 CPX#31
550 BNE inloop
560 LDA temp+diff%
570 CMP#9
580 BEQ help
590 CMP#4
600 BEQ unrec
610 .splat
620 JSR locate+diff%
630 PLA
640 TAY
650 PLA
660 TAX
670 PLA
680 RTS
690 .help
700 JSR osnewl
710 LDX#&FF
720 .helploop
730 INX
740 LDA title2+diff%,X
750 JSR osasci
760 BNE helploop
770 JSR osnewl
780 LDX#0
790 .hstart
800 LDA (comline),Y
810 CMP#91
820 BCS adjust
830 CMP#13
840 BNE miss
850 CPX#4
860 BCC bye
870 .miss
880 CMP Htext+diff%,X
890 BEQ su
900 LDA (comline),Y
910 CMP#13
920 INY
930 BNE hstart
940 CPX#5
950 BCS explain
960 .bye
970 JMP splat+diff%
980 .explain
990 LDA#helpcode MOD256
1000 STA&70
1010 LDA#helpcode DIV256
1020 STA&71
1030 DEC&70
1040 .disp
1050 INC&70
1060 LDA (&70),Y
1070 JSR osasci
1080 LDA&70
1090 CMP#255
1100 BEQ next
1110 LDA (&70),Y
1120 BNE disp
1130 .outhelp
1140 JMP out+diff%
1150 .adjust
1160 SEC
1170 SBC#32
1180 STA (comline),Y
1190 JMP hstart+diff%
1200 .next
1210 LDA#255
1220 STA&70
1230 INC&71
1240 JMP disp+diff%
1250 .su
1260 INX
1270 JMP hstart+diff%
1280 .unrec
1290 LDA#0
1300 STA&80
1310 STA&72
1320 LDX#1
1330 .loop
1340 LDA&72
1350 CMP#3
1360 BEQ char
1370 .nochar
1380 LDA&72
1390 CMP#5
1400 BEQ large
1410 .blarge
1420 LDA table+diff%,X
1430 .backhigh
1440 CMP (comline),Y
1450 BEQ part
1460 LDA (comline),Y
1470 CMP#91
1480 BCS high
1490 CMP#32
1500 BEQ spacebar
1510 .not
1520 INX
1530 LDA&80
1540 CMP#1
1550 BNE noback
1560 DEY
1570 .noback
1580 LDA#0
1590 STA&80
1600 STA&72
1610 CPX#100
1620 BNE loop
1630 JMP splat+diff%
1640 .high
1650 SEC
1660 SBC#32
1670 STA (comline),Y
1680 JMP backhigh+diff%
1690 .spacebar
1700 INY
1710 JMP nochar+diff%
1720 .part
1730 LDA&80
1740 BNE clear
1750 DEX
1760 LDA table+diff%,X
1770 CMP#13
1780 BNE fake
1790 LDA#1
1800 STA&80
1810 INX
1820 .clear
1830 LDA table+diff%,X
1840 CMP#13
1850 BEQ find
1860 INX
1870 INY
1880 INC&72
1890 JMP loop+diff%
1900 .fake
1910 INX
1920 LDA#0
1930 STA&80
1940 JMP not+diff%
1950 .char
1960 LDA (comline),Y
1970 CMP#ASC"R"
1980 BEQ char22
1990 CMP#ASC"r"
2000 BEQ char22
2010 CMP#ASC"P"
2020 BEQ flip
2030 CMP#ASC"p"
2040 BEQ flip
2050 CMP#ASC"M"
2060 BEQ norm
2070 CMP#ASC"m"
2080 BEQ norm
2090 JMPfile+diff%
2100 .seeya
2110 LDA#0
2120 STA&72
2130 JMP nochar+diff%
2140 .large
2150 JMPlarge2+diff%
2160 .norm
2170 INY
2180 LDA (comline),Y
2190 CMP#33
2200 BCS seeya
2210 CMP#32:BEQ norm
2220 LDA#20
2230 LDX#fxcode
2240 LDY#0
2250 JSR osbyte
2260 JMP out+diff%
2270 .char22
2280 INY
2290 LDA (comline),Y
2300 STA charX
2310 INY
2320 LDA (comline),Y
2330 STA charY
2340 JMP out+diff%
2350 .flip
2360 INY
2370 LDA (comline),Y
2380 CMP#ASC"X"
2390 BEQ flipX
2400 CMP#ASC"x"
2410 BEQ flipX
2420 CMP#ASC"Y"
2430 BEQ flipY
2440 CMP#ASC"y"
2450 BEQ flipY
2460 JMP splat+diff%
2470 .flipX
2480 JSR flipXX+diff%
2490 JMP out+diff%
2500 .flipY
2510 JSR flipYY+diff%
2520 JMP out+diff%
2530 .find
2540 STX&70
2550 CPX#7
2560 BEQ fat1
2570 CPX#12
2580 BEQ thin1
2590 CPX#17
2600 BEQ anti1
2610 CPX#24
2620 BEQ clock1
2630 CPX#32
2640 BEQ inverse1
2650 .out
2660 JSR locate+diff%
2670 PLA
2680 TAY
2690 PLA
2700 TAX
2710 PLA
2720 LDA#0
2730 RTS
2740 .fat1
2750 LDA#1
2760 JSR font2+diff%
2770 JMP out+diff%
2780 .thin1
2790 LDA#0
2800 JSR font2+diff%
2810 JMP out+diff%
2820 .anti1
2830 LDA#0
2840 STA&74
2850 JMP go+diff%
2860 .clock1
2870 LDA#1
2880 STA&74
2890 .go
2900 JSR rotation+diff%
2910 JMP out+diff%
2920 .inverse1
2930 JSR inv+diff%
2940 JMP out+diff%
2950 .flipXX
2960 LDA charX
2970 STA&70
2980 .loopX
2990 LDA&70
3000 STA patch
3010 STA patch2
3020 JSR definition+diff%
3030 LDX#0
3040 LDY#9
3050 .loopXX
3060 INX
3070 DEY
3080 LDA patch,X
3090 STA patch2,Y
3100 LDA patch,Y
3110 STA patch2,X
3120 CPX#4
3130 BNE loopXX
3140 JSR end+diff%
3150 LDA&70
3160 CMP charY
3170 BEQ finX
3180 INC&70
3190 JMP loopX+diff%
3200 .finX
3210 RTS
3220 .flipYY
3230 LDA charX
3240 STA&72
3250 DEC&72
3260 .flump
3270 INC&72
3280 LDA&72
3290 STA patch
3300 STA patch2
3310 JSR definition+diff%
3320 LDY#0
3330 .loopY
3340 LDA#128
3350 STA&73
3360 INY
3370 LDA#0
3380 STA&71
3390 LDA patch,Y
3400 STA space+diff%
3410 LDX#255
3420 LDA#1
3430 STA&80
3440 .loopYY
3450 INX
3460 LDA&80
3470 BIT space+diff%
3480 BNE add
3490 .outy
3500 CLC
3510 LSR&73
3520 ASL&80
3530 LDA&80
3540 BNE loopYY
3550 LDA&71
3560 STA patch2,Y
3570 CPY#8
3580 BNE loopY
3590 JSR end+diff%
3600 LDA&72
3610 CMP charY
3620 BNE flump
3630 RTS
3640 .add
3650 CLC
3660 LDA&71
3670 ADC&73
3680 STA&71
3690 JMP outy+diff%
3700 .table
3710 EQUB0
3720 EQUB0
3730 EQUB0
3740 EQUB13
3750 EQUS"FAT"
3760 EQUB13
3770 EQUS"THIN"
3780 EQUB13
3790 EQUS"ANTI"
3800 EQUB13
3810 EQUS"CLOCKW"
3820 EQUB13
3830 EQUS"INVERSE"
3840 EQUB13
3850 EQUS"NORM"
3860 EQUB13
3870 EQUS"CHAR"
3880 EQUB13
3890 EQUS"FLIP"
3900 EQUB13
3910 EQUS"CPUT"
3920 EQUB13
3930 EQUS"CGET"
3940 EQUB13
3950 EQUS"LARGE"
3960 EQUB13
3970 EQUS"DEFIN"
3980 EQUB13
3990 .Htext
4000 EQUS"CRAZY"
4010 .coded
4020 EQUS"  ANTI        Rotate selected
chars 90 degrees anticlockwise"
4030 EQUB13
4040 EQUS"  CGET        <fsp> Loads Cra
zy Characters! file"
4050 EQUB13
4060 EQUS"  CHAR<XY>    Informs charact
ers from X to Y to be acted apon"
4070 EQUB13
4080 EQUS"  CLOCKW      Rotate selected
chars 90 degrees clockwise"
4090 EQUB13
4100 EQUS"  CPUT        <fsp> Saves sel
ected chars"
4110 EQUB13
4120 EQUS"  DEFIN<X>    Prints definiti
on of character X"
4130 EQUB13
4140 EQUS"  FAT         Selected chars
fattened!"
4150 EQUB13
```

Continued ▶

CHARACTER UTILITY

◀ Continued

```
 4160 EQUS"  FLIPX        Flip selected c
hars across x-plane"
 4170 EQUB13
 4180 EQUS"  FLIPY        Flip selected c
hars across y-plane"
 4190 EQUB13
 4200 EQUS"  INVERSE      Inverses select
ed chars"
 4210 EQUB13
 4220 EQUS"  LARGE<X><Y> Message Y print
ed X characters high"
 4230 EQUB13
 4240 EQUS"  NORM         Restores all ch
ars to original states"
 4250 EQUB13
 4260 EQUS"  THIN         Selected chars
thinned!"
 4270 EQUB13
 4280 EQUB0
 4290 .title2
 4300 EQUS"Crazy Characters! 1.2  ("
 4310 .version
 4320 EQUB0
 4330 EQUS")"
 4340 EQUB13
 4350 EQUS"by Tim Campen"
 4360 EQUB13
 4370 EQUS"  CRAZY"
 4380 EQUB0
 4390 .temp
 4400 EQUB0
 4410 .rotation
 4420 LDA charX
 4430 STA&72
 4440 DEC&72
 4450 .startA
 4460 INC&72
 4470 LDA&72
 4480 STA patch
 4490 STA patch2
 4500 JSR definition+diff%
 4510 LDA#1
 4520 STA&80
 4530 LDX#0
 4540 LDA#9
 4550 STA&76
 4560 .loopA
 4570 LDA&74
 4580 BEQ an1
 4590 LDA#1
 4600 STA&73
 4610 JMP nan1+diff%
 4620 .an1
 4630 LDA#128
 4640 STA&73
 4650 .nan1
 4660 INX
 4670 DEC&76
 4680 LDY#0
 4690 LDA#0
 4700 STA&71
 4710 .loopAA
 4720 INY
 4730 LDA patch,Y
 4740 STA space+diff%
 4750 LDA&80
 4760 BIT space+diff%
 4770 BNE addY
 4780 .outf
 4790 LDA&74
 4800 BEQ an2
 4810 ASL&73
 4820 JMP nan2+diff%
 4830 .an2
 4840 LSR&73
 4850 .nan2
 4860 CPY#8
 4870 BNE loopAA
 4880 LDA&74
 4890 CMP#1
 4900 BEQ cwsave
 4910 LDA&71
 4920 STA patch2,X
 4930 .backcw
 4940 ASL&80
 4950 LDA&80
 4960 BNE loopA
 4970 JSR end+diff%
 4980 LDA&72
 4990 CMP charY
 5000 BNE startA
 5010 RTS
 5020 .addY
 5030 CLC
 5040 LDA&73
 5050 ADC&71
 5060 STA&71
 5070 JMP outf+diff%
 5080 .cwsave
 5090 LDA&76
 5100 TAX
 5110 LDA&71
 5120 STA patch2,X
 5130 JMP backcw+diff%
 5140 .definition
 5150 LDX#patch MOD256
 5160 LDY#patch DIV256
 5170 LDA#&A
 5180 JSR osword
 5190 RTS
 5200 .end
 5210 LDX#0
 5220 LDA#23
 5230 JSR oswrch
 5240 LDA patch2
 5250 JSR oswrch
 5260 .loop2
 5270 LDA patch2+1,X
 5280 JSR oswrch
 5290 INX
 5300 CPX#8
 5310 BNE loop2
 5320 RTS
 5330 .inv
 5340 LDA charX
 5350 STA &73
 5360 LDA charY
 5370 STA&74
 5380 LDA&73
 5390 STA&72
 5400 DEC&72
 5410 .inv_loop
 5420 INC&72
 5430 LDA&72
 5440 STA patch
 5450 STA patch2
 5460 JSR definition+diff%
 5470 LDX#255
 5480 .pop
 5490 INX
 5500 LDA patch+1,X
 5510 EOR#&FF
 5520 STA patch2+1,X
 5530 CPX#8
 5540 BNE pop
 5550 JSR end+diff%
 5560 LDA&72
 5570 CMP&74
 5580 BNE inv_loop
 5590 RTS
 5600 .font2
 5610 BNE fat
 5620 LDA#61
 5630 STA convert+diff%
 5640 JMP thin+diff%
 5650 .fat
 5660 LDA#&1D
 5670 STA convert+diff%
 5680 .thin
 5690 LDA charX
 5700 STA&72
 5710 DEC&72
 5720 .font_loop
 5730 INC&72
 5740 LDA&72
 5750 STA patch
 5760 STA patch2
 5770 JSR definition+diff%
 5780 LDX#255
 5790 .pop2
 5800 INX
 5810 LDA patch+1,X
 5820 LSR A
 5830 .convert
 5840 AND patch+1,X
 5850 STA patch2+1,X
 5860 CPX#8
 5870 BNE pop2
 5880 JSR end+diff%
 5890 LDA&72
 5900 CMP charY
 5910 BNE font_loop
 5920 RTS
 5930 .locate
 5940 LDX#255
 5950 .outloop
 5960 INX
 5970 LDA zero+diff%,X
 5980 STA &70,X
 5990 CPX#10
 6000 BCS nobuf2
 6010 LDA buffer+diff%,X
 6020 STA patch,X
 6030 .nobuf2
 6040 CPX#31
 6050 BNE outloop
 6060 RTS
 6070 .file
 6080 DEY
 6090 LDA(comline),Y
 6100 CMP#ASC"U"
 6110 BEQ save
 6120 CMP#ASC"u"
 6130 BEQ save
 6140 CMP#ASC"E"
 6150 BEQ load
 6160 CMP#ASC"e"
 6170 BEQ load
 6180 INY
 6190 JMPnochar+diff%
 6200 .load
 6210 JMP load2+diff%
 6220 .save
 6230 LDX#0
 6240 .resetl
 6250 LDA#32
 6260 STAfilename+diff%,X
 6270 INX
 6280 CPX#20
 6290 BNE resetl
 6300 JSR findname+diff%
 6310 LDA charX
 6320 STA&80
 6330 LDA charY
 6340 STA&81
 6350 INC&81
 6360 LDA#0
 6370 STA&82
 6380 LDA#&27
 6390 STA&83
 6400 LDA&83
 6410 AND#15
 6420 STAareas+1
 6430 LDA&83
 6440 JSR lsrac+diff%
 6450 STAareas
 6460 LDA&82
 6470 AND#15
 6480 STAareas+3
 6490 LDA&82
 6500 JSR lsrac+diff%
 6510 STAareas+2
 6520 JSR swapup+diff%
 6530 JSR sendl+diff%
 6540 LDA&83
 6550 AND#15
 6560 STAareas+6
 6570 LDA&83
 6580 JSR lsrac+diff%
 6590 STAareas+5
 6600 LDA&82
 6610 AND#15
 6620 STAareas+8
 6630 LDA&82
 6640 JSR lsrac+diff%
 6650 STAareas+7
 6660 LDX#255
 6670 .kal
 6680 INX
 6690 LDAareas+5,X
 6700 CLC
 6710 ADC#48
 6720 CMP#58
 6730 BCS hex
 6740 .bhex
 6750 STAareas+5,X
 6760 LDAareas,X
 6770 CLC
 6780 ADC#48
 6790 CMP#58
 6800 BCS hex2
 6810 .bhex2
 6820 STAareas,X
 6830 CPX#3
 6840 BNE kal
 6850 LDA#13
 6860 STA areas+9
 6870 LDX#0
 6880 .savelo
 6890 LDAsacode+diff%,X
 6900 STA scode2,X
 6910 INX
 6920 CPX#4
 6930 BNEsavelo
 6940 JSR filingup+diff%
 6950 LDX#&E0
 6960 LDY#&26
 6970 JSR oscli
 6980 JSR filingdown+diff%
 6990 JSR swapdown+diff%
 7000 JMP out+diff%
 7010 .swaping
 7020 JSRdefinition+diff%
 7030 LDY#255
 7040 .lswap
 7050 INY
 7060 LDApatch,Y
 7070 STA(&82),Y
 7080 CPY#8
 7090 BNE lswap
 7100 JMP bswaping+diff%
 7110 .hex
 7120 CLC
 7130 ADC#7
 7140 JMPbhex+diff%
 7150 .hex2
 7160 CLC
 7170 ADC#7
 7180 JMPbhex2+diff%
 7190 .sendl
 7200 LDA&80
 7210 STApatch
 7220 JMP swaping+diff%
 7230 .bswaping
 7240 CLC
 7250 LDA&82
 7260 ADC#9
 7270 BCS set80
 7280 .bset80
 7290 STA&82
 7300 INC&80
 7310 LDA&80
 7320 CMP&81
 7330 BNE sendl
 7340 LDX#0
 7350 LDY#0
 7360 .trans
 7370 LDAheader+diff%,X
 7380 STA(&82),Y
 7390 INX
 7400 INY
 7410 CPX#9
 7420 BNE trans
 7430 CLC
 7440 LDA&82
 7450 ADC#8
 7460 BCS sethead
 7470 .bsethead
 7480 STA&82
 7490 RTS
 7500 .set80
 7510 INC&83
 7520 JMPbset80+diff%
 7530 .sethead
 7540 INC&83
 7550 JMPbsethead+diff%
 7560 .remember
 7570 LDY#0
 7580 .ramloop1
 7590 LDA(&72),Y
 7600 STA(&70),Y
 7610 INC&70
 7620 INC&72
 7630 LDA&70
 7640 BEQ next1
 7650 .bnext1
 7660 LDA&72
 7670 BEQ next2
 7680 .bnext2
 7690 LDA&72
 7700 .Azero
 7710 CMP#0
 7720 BEQ endram
 7730 JMP ramloop1+diff%
 7740 .next1
 7750 INC&71
 7760 JMP bnext1+diff%
 7770 .next2
 7780 INC&73
 7790 JMP bnext2+diff%
 7800 .endram2
 7810 RTS
 7820 .endram
 7830 LDA&73
 7840 .Bzero
 7850 CMP#&67
 7860 BEQ endram2
 7870 JMP ramloop1+diff%
 7880 .load2
 7890 LDX#0
 7900 .copyl
 7910 LDAcopyi+diff%,X
 7920 STAscode2,X
 7930 INX
 7940 CPX#21
 7950 BNE copyl
 7960 JSR findname+diff%
 7970 JSR swapup+diff%
 7980 JSR filingup+diff%
 7990 LDX#&E0
 8000 LDY#&26
 8010 JSR oscli
 8020 JSR filingdown+diff%
 8030 LDA#0
 8040 STA&70
 8050 LDA#&27
 8060 STA&71
 8070 LDY#0
 8080 .defhead
 8090 LDA(&70),Y
 8100 CMPheader+diff%
 8110 BEQ headK
 8120 .bheadK
 8130 LDX#0
 8140 .loopload
 8150 LDA(&70),Y
 8160 STApatch2,X
 8170 INX
 8180 INY
 8190 CPX#9
 8200 BNE loopload
 8210 JSR end+diff%
 8220 LDY#0
 8230 CLC
 8240 LDA&70
 8250 ADC#9
 8260 BCS pageb
 8270 .bpageb
 8280 STA&70
 8290 JMP defhead+diff%
 8300 .pageb
 8310 INC&71
 8320 JMP bpageb+diff%
 8330 .headK
 8340 INX
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```
8350 INY
8360 LDA(&70),Y
8370 CMPheader+diff%,X
8380 BNE notnowK
8390 JMP headK+diff%
8400 .notnowK
8410 CPX#9
8420 BEQ enddefK
8430 LDX#0
8440 LDY#0
8450 JMP bheadK+diff%
8460 .enddefK
8470 JSR swapdown+diff%
8480 JMP out+diff%
8490 .enlarge
8500 LDA#240
8510 STApatch
8520 TYA
8530 PHA
8540 JSR definition+diff%
8550 LDX#1
8560 PLA
8570 TAY
8580 .retain
8590 LDApatch,X
8600 STAstoring,X
8610 INX
8620 CPX#9
8630 BNE retain
8640 INY
8650 STY&78
8660 .gilbert
8670 LDY&78
8680 LDA(comline),Y
8690 CMP#13
8700 BEQ NoLarge
8710 STApatch
8720 LDA#0
8730 STA&70
8740 LDA#255
8750 STA&71
8760 STA&74
8770 STA&72
8780 JSR definition+diff%
8790 .repeatloopK
8800 INC&71
8810 INC&74
8820 LDA&74
8830 CMP#8
8840 BEQ resetK
8850 .bresetK
8860 JMP maths+diff%
8870 .bmaths
8880 CPX#7
8890 BNE repeatloopK
8900 JMP defineK+diff%
8910 .bdefineK
8920 LDA&70
8930 CMP&73
8940 BNE repeatloopK
8950 INC&78
8960 LDX#0
8970 LDA#11
8980 .upl
8990 JSR oswrch
9000 INX
9010 CPX&73
9020 BNE upl
9030 LDA#9
9040 JSR oswrch
9050 JMP gilbert+diff%
9060 .NoLarge
9070 LDX#0
9080 LDA#10
9090 .doloop
9100 JSR oswrch
9110 INX
9120 CPX&73
9130 BNE doloop
9140 LDA#13
9150 JSR oswrch
9160 PLA
9170 TAY
9180 LDX#1
9190 LDA#240
9200 STApatch2
9210 .pull
9220 LDAstoring,X
9230 STApatch2,X
9240 INX
9250 CPX#9
9260 BNE pull
9270 JSR end+diff%
9280 JMP out+diff%
9290 .resetK
9300 LDA#0
9310 STA&74
9320 JMP bresetK+diff%
9330 .maths
9340 LDA#0
9350 STA&77
9360 LDX#0
9370 .looplsr
9380 CLC
9390 LDA&77
9400 ADC&73
9410 STA&77
9420 CMP&71
9430 BCS overK
9440 INX
9450 JMP looplsr+diff%
9460 .overK
9470 STX&77
9480 CLC
9490 LDApatch+1,X
9500 LDX&74
9510 STA patch2,X
9520 JMP bmaths+diff%
9530 .defineK
9540 INC&70
9550 LDA#23
9560 JSR oswrch
9570 LDA#240
9580 JSR oswrch
9590 LDX#0
9600 .dloop
9610 LDApatch2,X
9620 JSR oswrch
9630 INX
9640 CPX#8
9650 BNE dloop
9660 LDA#240
9670 JSR oswrch
9680 LDA#10
9690 JSR oswrch
9700 LDA#8
9710 JSR oswrch
9720 JMP bdefineK+diff%
9730 .large2
9740 TYA
9750 PHA
9760 LDY#5
9770 LDA(comline),Y
9780 CMP#ASC"E"
9790 BEQ foundlar
9800 CMP#ASC"e"
9810 BEQ foundlar
9820 CMP#ASC"N"
9830 BEQ foundef
9840 CMP#ASC"n"
9850 BEQ foundef
9860 PLA
9870 TAY
9880 JMP blarge+diff%
9890 .foundlar
9900 INY
9910 LDA(comline),Y
9920 CMP#65
9930 BCS hexN
9940 SEC
9950 SBC#48
9960 STA&73
9970 JMP enlarge+diff%
9980 .hexN
9990 SEC
10000 SBC#55
10010 STA&73
10020 JMP enlarge+diff%
10030 .foundef
10040 INY
10050 LDA(comline),Y
10060 STApatch
10070 JSRdefinition+diff%
10080 LDX#1
10090 .defKloop
10100 LDA#38
10110 JSR oswrch
10120 LDApatch,X
10130 PHA
10140 AND#&F0
10150 JSR lsrac+diff%
10160 CLC
10170 ADC#48
10180 CMP#58
10190 BCS Hset
10200 .bHset
10210 JSR oswrch
10220 PLA
10230 AND#&F
10240 CLC
10250 ADC#48
10260 CMP#58
10270 BCS Hset2
10280 .bHset2
10290 JSR oswrch
10300 CPX#8
10310 BEQ endinfo
10320 LDA#ASC","
10330 JSR oswrch
10340 INX
10350 JMPdefKloop+diff%
10360 .endinfo
10370 PLA
10380 TAY
10390 LDA#13
10400 JSR osasci
10410 JMP out+diff%
10420 .Hset
10430 CLC
10440 ADC#7
10450 JMP bHset+diff%
10460 .Hset2
10470 CLC
10480 ADC#7
10490 JMP bHset2+diff%
10500 .swapup
10510 LDA#storing MOD256
10520 STA&70
10530 LDA#storing DIV256
10540 STA&71
10550 LDA#0
10560 STA&72
10570 LDA#&27
10580 STA&73
10590 LDA#0
10600 STA Azero+1+diff%
10610 LDA#&2F
10620 STA Bzero+1+diff%
10630 JSR remember+diff%
10640 RTS
10650 .filingup
10660 LDX#0
10670 .filoop1
10680 LDA&26E0,X
10690 STA filepatch+diff%,X
10700 LDAscode2,X
10710 STA&26E0,X
10720 INX
10730 CPX#26
10740 BNE filoop1
10750 RTS
10760 .filingdown
10770 LDX#0
10780 .filoop2
10790 LDA filepatch+diff%,X
10800 STA&26E0,X
10810 INX
10820 CPX#26
10830 BNE filoop2
10840 RTS
10850 .swapdown
10860 LDA#storing MOD256
10870 STA&72
10880 LDA#storing DIV256
10890 STA&73
10900 LDA#0
10910 STA&70
10920 LDA#&27
10930 STA&71
10940 LDA#storplus MOD256
10950 STA Azero+1+diff%
10960 LDA#storplus DIV256
10970 STA Bzero+1+diff%
10980 JSR remember+diff%
10990 RTS
11000 .findname
11010 INY
11020 LDX#255
11030 .nospa
11040 INX
11050 INY
11060 LDA(comline),Y
11070 CMP#13
11080 BEQ cr13
11090 CMP#32
11100 BEQ spaces
11110 STA filename+diff%,X
11120 JMP nospa+diff%
11130 .spaces
11140 DEX
11150 JMPnospa+diff%
11160 .cr13
11170 RTS
11180 .lsrac
11190 LSRA
11200 LSRA
11210 LSRA
11220 LSRA
11230 RTS
11240 .sacode
11250 EQUS"*SA."
11260 .copyi
11270 EQUS"*LO."
11280 EQUD&20202020
11290 EQUD&20202020
11300 EQUD&20202020
11310 EQUS"2700"
11320 EQUB13
11330 .header
11340 EQUS"(C)BAUTC"
11350 .buffer
11360 EQUD0
11370 EQUD0
11380 EQUD0
11390 .zero
11400 EQUD0
11410 EQUD0
11420 EQUD0
11430 EQUD0
11440 EQUD0
11450 EQUD0
11460 EQUD0
11470 EQUD0
11480 EQUD0
11490 .patch2
11500 EQUD0
11510 EQUD0
11520 EQUW0
11530 .charX
11540 BRK
11550 .charY
11560 BRK
11570 .space
11580 BRK
11590 .scode2
11600 EQUD&20202020
11610 EQUB32
11620 .filename
11630 EQUD&20202020
11640 EQUD&20202020
11650 EQUW&2020
11660 EQUB32
11670 .areas
11680 EQUD&20202020
11690 EQUD&20202020
11700 EQUW&2020
11710 EQUB13
11720 .filepatch
11730 EQUD0
11740 EQUD0
11750 EQUD0
11760 EQUD0
11770 EQUD0
11780 EQUD0
11790 EQUD0
11800 .storing
11810 ]
11820 helpcode=coded+diff%
11830 scode2=scode2+diff%
11840 areas=areas+diff%
11850 storing=storing+diff%
11860 storplus=storing+&600
11870 patch2=patch2+diff%
11880 charX=charX+diff%
11890 charY=charY+diff%
11900 IF fxcode=0 THEN ?version=ASC"M" E
LSE ?version=ASC"B"
11910 NEXT
11920 PROCcheck
11930 IF ?version=ASC"M" AND C%<>&4B187
PROCerror
11940 IF ?version=ASC"B" AND C%<>&4B182
PROCerror
11950 PRINT"Press <SPACE BAR> to save 'C
RAZYC'"
11960 REPEAT:UNTIL GET=32
11970 *SAVE"CRAZYC" 5B00 65E2 8000 8000
11980 END
11990 :
12000 DEF PROCcheck
12010 PRINT"Checking..."
12020 C%=0
12030 FOR N=&5B00 TO &65E0
12040 C%=C%+?N
12050 NEXT
12060 ENDPROC
12070 :
12080 DEF PROCerror
12090 PRINT"Checksum error...please chec
k"
12100 END
```

Listing 2

```
   10 REM Crazy Characters! DEMO
   20 REM by Tim Campen
   30 REM for B/B+/M/C
   40 REM (c) BAU July 1990
   50 :
   60 REM If running on a Model B
   70 REM Make sure PAGE=PAGE+&600
   80 REM before loading & running
   90 :
  100 MODE 1
  110 A$="LIKE THIS !"
  120 VDU23,1,0;0;0;0;
  130 VDU19,0,4;0;
  140 *NORM
  150 COLOUR2
  160 PRINTTAB(10,1);
  170 *LARGE5 CRAZY CHARACTERS!
  180 *NORM
  190 COLOUR2
  200 *CHAR(z
  210 *ANTI
  220 *FAT
  230 *CLOCKW
  240 *NORM
  250 COLOUR3
  260 PRINT''" The simple sideways Ram p
athway to..."'
  270 PRINT"Rotate text anti-clockwise
 ";
  280 *ANTI
  290 PRINTA$
  300 *NORM
  310 PRINT"Rotate text clockwise
 ";
  320 *CLOCKW
  330 PRINTA$
  340 *NORM
  350 PRINT'"Flip text across the x-plan
```

Continued ▶

CHARACTER UTILITY

◀ Continued

```
e ";
 36Ø *FLIPX
 37Ø PRINTA$
 38Ø *NORM
 39Ø PRINT"Flip text across the y-plane
";
 4ØØ *FLIPY
 41Ø PRINTA$
 42Ø *NORM
 43Ø *FAT
 44Ø PRINT'SPC(9)"FATTEN, ";
 45Ø *NORM
 46Ø *THIN
 47Ø PRINT "THIN, ";
 48Ø *NORM
 49Ø *INVERSE
 5ØØ PRINT"INVERSE"
 51Ø *NORM
 52Ø PRINT'"  Find a definition:"
 53Ø COLOUR 2
 54Ø PRINTSPC(3)"A=";
 55Ø *DEFINA
 56Ø COLOUR3:PRINT''
 57Ø *LARGE4 AND {
 58Ø PRINTTAB(6,23)"Save characters, eg
*CPUT FRED";
 59Ø *LARGE4}
 6ØØ PRINTTAB(6,24)"Load characters, eg
*CGET JOHN"
 61Ø PRINTTAB(6,25)"PLUS";
 62Ø *LARGE2 MULTI-HEIGHT
 63Ø PRINTTAB(24,25)"*LARGE3 KATE"
 64Ø COLOUR1
 65Ø *THIN
 66Ø PRINTTAB(4,3Ø)"All just a few * co
mmands away"
 67Ø IF GET
 68Ø *FX15,1
 69Ø REPEAT UNTIL GET
 7ØØ *KEYØ *HELP CRAZY|M
 71Ø *FX138,Ø,128
 72Ø END
```

CLASSIC EIGHT BITS

Listing 1

```
   1Ø REM Hints & Tips
   2Ø REM Disc Sector Editor
   3Ø REM by Martin Phillips
   4Ø REM BBC B/B+/B+128/Master 128
   5Ø REM (c) Acorn User
   6Ø :
   7Ø IF PAGE<>&19ØØ PRINT"Reload at &19
ØØ":END
   8Ø MODE Ø
   9Ø PROCinit
  1ØØ PROCrun
  11Ø MODE 7
  12Ø END
  13Ø :
  14Ø DEF PROCinit
  15Ø *KEY1Ø OLD|M |N LIST|M
  16Ø DIM C$(1)
  17Ø wide=&13ØØ:p=&138Ø:data=&14ØØ
  18Ø S%=Ø:T%=Ø:D%=Ø:M%=Ø:@%=2
  19Ø H$="Ø123456789ABCDEF"
  2ØØ B$="Disc Sector Editor"
  21Ø C$(Ø)=" Hex ":C$(1)="ASCII"
  22Ø *FX 4,1
  23Ø *KEYØ |!|L
  24Ø *KEY1 |!|M
  25Ø *KEY2 |!|N
  26Ø *KEY3 |!|O
  27Ø *KEY4 |!|p
  28Ø *KEY5 |!|Q
  29Ø *KEY6 |!|R
  3ØØ *KEY9 |!|S
  31Ø VDU 19,Ø,6,Ø,Ø,Ø
  32Ø VDU 19,1,4,Ø,Ø,Ø
  33Ø VDU 23;82Ø2;Ø;Ø;Ø;
  34Ø VDU 23,128,Ø,6Ø,36,36,36,36,6Ø,Ø
  35Ø VDU 23,129,Ø,6Ø,6Ø,6Ø,6Ø,6Ø,6Ø,Ø
  36Ø PROCmc
  37Ø ENDPROC
  38Ø :
  39Ø DEF PROCrun
  4ØØ PROCscreen
  41Ø PROCtkno
  42Ø PROCrdsec
  43Ø PROCdisplay
  44Ø x%=Ø:y%=Ø:M%=Ø
  45Ø PROCrev
  46Ø REPEAT
  47Ø PROCinput
  48Ø UNTIL G%>14Ø
  49Ø IF G%<147 THEN GOTO 42Ø
  5ØØ ENDPROC
  51Ø :
  52Ø DEF PROCscreen
  53Ø VDU 24,Ø;9Ø8;1279;1Ø23;18,Ø,129,16
,26
  54Ø VDU 24,Ø;Ø;1279;128;18,Ø,129,16,26
  55Ø COLOUR Ø:COLOUR 129
  56Ø PRINTTAB(4,29)"fØ"TAB(8)"f1"TAB(16
)"f2";
  57Ø PRINTTAB(25)"f3"TAB(34)"f4"TAB(43)
"f5"TAB(52)"f6"TAB(67)"f9"
  58Ø PRINTTAB(2,3Ø)" Hex "TAB(8)"Print"
TAB(16)"Drive"TAB(25)"Sector";
  59Ø PRINTTAB(34)"Track"TAB(44)"Scan"TA
B(52)"Write";TAB(68)"End"
  6ØØ PROCdouble(B$,2Ø,1)
  61Ø COLOUR 1:COLOUR 128
  62Ø MOVE 24,264:DRAW 24,872
  63Ø DRAW 1248,872:DRAW 1248,264
  64Ø DRAW 24,264
  65Ø MOVE 24,824:DRAW 1248,824
  66Ø MOVE 88,264:DRAW 88,872
  67Ø MOVE 928,264:DRAW 928,872
  68Ø FOR x%=Ø TO 15
  69Ø PRINTTAB(3*x%+9,5);~x%
  7ØØ PRINTTAB(6Ø+x%,5);~x%:NEXT
  71Ø FOR y%=Ø TO 15
  72Ø PRINTTAB(3,7+y%);~y%:NEXT
  73Ø ENDPROC
  74Ø :
  75Ø DEF PROCdisplay
  76Ø FOR y%=Ø TO 15
  77Ø FOR x%=Ø TO 15
  78Ø PROCtype(2)
  79Ø NEXT:NEXT
  8ØØ ENDPROC
  81Ø :
  82Ø DEF PROCrev
  83Ø PROCtype(2):COLOUR 129:COLOUR Ø
  84Ø PROCtype(M%):COLOUR 128:COLOUR 1
  85Ø ENDPROC
  86Ø :
  87Ø DEF PROCtype(box)
  88Ø C%=?(data+x%+y%*16)
  89Ø IF box=1 THEN GOTO 92Ø
  9ØØ PRINTTAB(3*x%+8,7+y%)~C%;
  91Ø IF box=Ø THEN ENDPROC
  92Ø PRINTTAB(6Ø+x%,7+y%);
  93Ø IF C%<32 THEN VDU 128:ENDPROC
  94Ø IF C%>127 THEN VDU 129:ENDPROC
  95Ø VDU C%
  96Ø ENDPROC
  97Ø :
  98Ø DEF PROCinput
  99Ø G%=GET
 1ØØØ PROCtype(M%)
 1Ø1Ø IF x%>Ø AND G%=136 THEN x%=x%-1
 1Ø2Ø IF x%<15 AND G%=137 THEN x%=x%+1
 1Ø3Ø IF y%>Ø AND G%=139 THEN y%=y%-1
 1Ø4Ø IF y%<15 AND G%=138 THEN y%=y%+1
 1Ø5Ø IF G%=14Ø THEN M%=(M%+1) MOD 2:COL
OUR Ø:COLOUR 129:PRINTTAB(2,3Ø)C$(M%):CO
LOUR 1:COLOUR 128:GOTO 116Ø
 1Ø6Ø IF G%=141 THEN PROCprint:ENDPROC
 1Ø7Ø IF G%=142 THEN PROCdr:ENDPROC
 1Ø8Ø IF G%=143 THEN PROCsec:ENDPROC
 1Ø9Ø IF G%=144 THEN PROCtk:ENDPROC
 11ØØ IF G%=145 THEN PROCscan:ENDPROC
 111Ø IF G%=146 THEN PROCwrsec:ENDPROC
 112Ø IF G%>126 THEN GOTO 116Ø
 113Ø I%=INSTR(H$,CHR$(G%))
 114Ø IF M%=Ø AND I%=Ø THEN GOTO 116Ø
 115Ø PROCupdate
 116Ø PROCrev
 117Ø ENDPROC
 118Ø :
 119Ø DEF PROCupdate
 12ØØ IF M%=1 THEN C%=G%:GOTO127Ø
 121Ø C%=(C% AND 15)+(I%-1)*16
 122Ø ?(data+x%+y%*16)=C%
 123Ø PROCrev
 124Ø REPEAT:I%=INSTR(H$,CHR$(GET))
 125Ø UNTIL I%>Ø
 126Ø C%=(C% AND 24Ø)+I%-1
 127Ø ?(data+x%+y%*16)=C%
 128Ø PROCtype(2)
 129Ø IF x%<15 THEN x%=x%+1 ELSE x%=Ø:y%
=(y%+1)MOD15
 13ØØ ENDPROC
 131Ø :
 132Ø DEF'PROCprint
 133Ø PROCshow("Printing sector")
 134Ø *FX 3,1Ø
 135Ø VDU 1,14
 136Ø PRINTSPC(1Ø)B$''STRING$(76,"-")
 137Ø PRINT"|   |";
 138Ø FOR x%=Ø TO 15:PRINT" "~x%;:NEXT
 139Ø PRINT"  |  ";
 14ØØ FOR x%=Ø TO 15:PRINT;~x%;:NEXT
 141Ø PRINT" |"
 142Ø PRINTSTRING$(76,"-")
 143Ø FOR y%=Ø TO 15
 144Ø PRINT"| ";~y%;" |";
 145Ø FOR x%=Ø TO 15
 146Ø C%=?(data+x%+y%*16)
 147Ø PRINT" "~C%;:NEXT:PRINT"  |  ";
 148Ø FOR x%=Ø TO 15
 149Ø C%=?(data+x%+y%*16)
 15ØØ IF C%<32 OR C%>126 THEN C%=46
 151Ø PRINTCHR$(C%);:NEXT:PRINT" |"
 152Ø NEXT y%
 153Ø PRINTSTRING$(76,"-")
 154Ø PRINTTAB(1Ø)"Drive:-"D% SPC(1Ø)"Se
ctor:-"S% SPC(1Ø)"Track:-"T%
 155Ø VDU 12
 156Ø *FX 3
 157Ø PRINTTAB(2Ø,26)SPC(3Ø)
 158Ø ENDPROC
 159Ø :
 16ØØ DEF PROCdouble(A$,x,y)
 161Ø X%=Ø:Y%=&A:A%=1Ø:do=&AØØ:d=&9ØØ
 162Ø C$=CHR$24Ø+CHR$241+CHR$8+CHR$8
 163Ø C$=C$+CHR$1Ø+CHR$242+CHR$243
 164Ø FOR N%=1 TO LEN(A$)
 165Ø ?do=ASC(MID$(A$,N%,1))
 166Ø CALL &FFF1:CALL wide
 167Ø VDU 23,24Ø,d?1,d?1,d?3,d?3,d?5,d?5
,d?7,d?7
 168Ø VDU 23,241,d?2,d?2,d?4,d?4,d?6,d?6
,d?8,d?8
 169Ø VDU 23,242,d?9,d?9,d?11,d?11,d?13,
d?13,d?15,d?15
 17ØØ VDU 23,243,d?1Ø,d?1Ø,d?12,d?12,d?1
4,d?14,d?16,d?16
 171Ø PRINTTAB(x+N%*2,y)C$
 172Ø NEXT N%
 173Ø ENDPROC
 174Ø :
 175Ø DEF PROCmc
 176Ø st=&9ØØ:chrdef=&AØØ
 177Ø tst=&7Ø:bct=&71:tbct=&72
 178Ø FOR pass%=Ø TO 2 STEP2
 179Ø P%=wide
 18ØØ [OPT pass%
 181Ø LDX #1
 182Ø LDY #1
 183Ø .loclp
 184Ø LDA #Ø
 185Ø STA tbct
 186Ø LDA chrdef,Y
 187Ø STA tst
 188Ø .loopa
 189Ø INC tbct
 19ØØ LDA #Ø
 191Ø STA bct
 192Ø .loopb
 193Ø LDA tst
 194Ø ROL A
 195Ø LDA st,X
 196Ø ROL A
 197Ø STA st,X
 198Ø LDA tst
 199Ø ROL A
 2ØØØ STA tst
 2Ø1Ø LDA st,X
 2Ø2Ø ROL A
 2Ø3Ø STA st,X
 2Ø4Ø INC bct
 2Ø5Ø LDA bct
 2Ø6Ø CMP #4
 2Ø7Ø BNE loopb
 2Ø8Ø INX
 2Ø9Ø LDA tbct
 21ØØ CMP #2
 211Ø BNE loopa
 212Ø INY
 213Ø CPY #9
 214Ø BNE loclp
 215Ø RTS
 216Ø ]NEXT pass%
 217Ø :
 218Ø REM Checksum
 219Ø total%=Ø
 22ØØ FOR byte%=wide TO P%-1
 221Ø total%=total%+?byte%
 222Ø NEXT byte%
 223Ø IF total%=6933 ENDPROC
 224Ø PRINT"Checksum error - please chec
k listing"
 225Ø END
 226Ø :
 227Ø DEF PROCrdsec
 228Ø p?Ø=D%:p!1=data:p?5=3
 229Ø p?6=&57:p?7=T%:p?8=S%:p?9=&21
 23ØØ PRINTTAB(12,24)"Drive:-"D%
 231Ø PRINTTAB(32,24)"Sector:-"S%
 232Ø PRINTTAB(53,24)"Track:-"T%
 233Ø PROCosword
 234Ø del%=res% AND 32
 235Ø res%=res% AND 3Ø
 236Ø IF res%=Ø THEN ENDPROC
 237Ø PROCshow("Disc read error")
 238Ø key=GET:PRINTTAB(2Ø,26)SPC(3Ø)
 239Ø ENDPROC
 24ØØ :
 241Ø DEF PROCosword
 242Ø A%=&7F:X%=p MOD 256
 243Ø Y%=p DIV 256
 244Ø CALL &FFF1:res%=p?1Ø:ENDPROC
 245Ø :
 246Ø DEF PROCdr
 247Ø PROCshow("Which drive (Ø-3)?")
 248Ø REPEAT k=GET-48
 249Ø UNTIL k>-1 AND k<4
 25ØØ D%=k:PRINTTAB(2Ø,26)SPC(3Ø)
 251Ø PROCtkno:ENDPROC
 252Ø :
 253Ø DEF PROCsec
 254Ø PROCshow("Which sector (Ø-9)?")
 255Ø REPEAT k=GET-48
 256Ø UNTIL k>-1 AND k<1Ø
 257Ø S%=k:PRINTTAB(2Ø,26)SPC(3Ø)
 258Ø ENDPROC
 259Ø :
 26ØØ DEF PROCtk
 261Ø PROCshow("Which track (Ø-"+STR$t%+
")?")
 262Ø INPUT""k
 263Ø T%=k:IF T%>t% THEN T%=Ø
 264Ø IF T%<Ø THEN T%=Ø
 265Ø PRINTTAB(2Ø,26)SPC(3Ø):ENDPROC
 266Ø :
 267Ø DEF PROCtkno
 268Ø A%=&7E:X%=&7Ø:Y%=Ø
 269Ø CALL &FFF1
 27ØØ t%=((?&71+?&72*256)DIV 1Ø)-1
 271Ø ENDPROC
 272Ø :
 273Ø DEF PROCscan
 274Ø PROCshow("Press space bar to stop
scan")
 275Ø REPEAT
 276Ø S%=S%+1
 277Ø IF S%=1Ø THEN S%=Ø:T%=T%+1
 278Ø IF T%>t% THEN T%=Ø
 279Ø PROCrdsec
 28ØØ PROCdisplay
 281Ø k=INKEY(2ØØ)
 282Ø UNTIL k>Ø
 283Ø PRINTTAB(2Ø,26)SPC(35)
 284Ø ENDPROC
 285Ø :
 286Ø DEF PROCwrsec
 287Ø p?Ø=D%:p!1=data
 288Ø IF del%<>Ø p?6=&4F ELSE p?6=&4B
 289Ø p?7=T%:p?8=S%:p?9=&21
 29ØØ PROCosword
 291Ø res%=res% AND&1E
 292Ø IF res%=Ø THEN ENDPROC
 293Ø PROCshow("Disc write error")
 294Ø key=GET:PRINTTAB(2Ø,26)SPC(3Ø)
 295Ø ENDPROC
 296Ø :
 297Ø DEF PROCshow(A$)
 298Ø COLOUR Ø:COLOUR 129
 299Ø PRINTTAB(2Ø,26)"  "A$"  ";
 3ØØØ COLOUR 1:COLOUR 128
 3Ø1Ø ENDPROC
```

Listing 2

```
  1Ø REM Hints & Tips
  2Ø REM Polar graphics
  3Ø REM by Martin Phillips
  4Ø REM for BBC B/B+/M/E
  5Ø REM (c) Acorn User
  6Ø :
  7Ø MODE Ø
  8Ø VDU 19,Ø,4,Ø,Ø,Ø
  9Ø REPEAT
 1ØØ PROCinput
 11Ø PROCinitialise
 12Ø PROCplot
 13Ø PRINT"Press a key ";
 14Ø A$=GET$
 15Ø UNTIL A$="E"
 16Ø END
 17Ø :
 18Ø DEF PROCinitialise
 19Ø step=Ø.Ø2
 2ØØ IF a>15 OR b>15 THEN step=Ø.ØØ2
 21Ø m=Ø.1E-3Ø
 22Ø FOR z=Ø TO 2*PI STEP Ø.1
 23Ø r=ABS(FNequation)
 24Ø IF m<r THEN m=r+step
```

```
250 NEXT z
260 ENDPROC
270  :
280 DEF PROCinput
290 CLS
300 PRINTTAB(20,5)"1..R=1"
310 PRINTTAB(20)"2..R=SIN(Z)"
320 PRINTTAB(20)"3..R=SIN(5*Z)"
330 PRINTTAB(20)"4..R=1+2*COS(Z)"
340 PRINTTAB(20)"5..R=1+COS(Z)"
350 PRINTTAB(20)"6..R=1+SIN(2*Z)"
360 PRINTTAB(20)"7..R=1+2*COS(2*Z)"
370 INPUT''"Enter a number (1-7)"n
380 IF n<1 or n>7 THEN GOTO 370
390 INPUT"A = "a
400 INPUT"B = "b
410 ENDPROC
420 :
430 DEF PROCplot
440 CLS
450 FOR z=0 TO 2*PI+step STEP step
460 r=FNequation
470 X%=640+512*COS(a*z)*r/m
480 Y%=512+512*SIN(b*z)*r/m
490 IF z=0 THEN MOVE X%,Y%
500 DRAW X%,Y%
510 NEXT z
520 ENDPROC
530 :
540 DEF FNequation
550 IF n=1 THEN =1
560 IF n=2 THEN =SIN(z)
570 IF n=3 THEN =SIN(5*z)
580 IF n=4 THEN =2*COS(z)
590 IF n=5 THEN =1+COS(z)
600 IF n=6 THEN =1+SIN(2*z)
610 =1+2*COS(2*z)
```

Listing 3

```
 10 REM Hints & Tips
 20 REM Polar graphics demo
 30 REM by Martin Phillips
 40 REM for BBC B/B+/M/E
 50 REM (c) Acorn User
 60 :
 70 MODE 0
 80 VDU 19,0,4,0,0,0
 90 VDU 23;8202;0;0;0;
100 REPEAT
110 FOR A=1 TO 10
120 FOR B=1 TO 10
130 FOR n=1 TO 10
140 PROCinitialise
150 PROCplot
160 I=INKEY(100)
170 NEXT n,B,A
180 UNTIL 0
190 END
200 :
210 DEF PROCinitialise
220 step=0.02
230 IF A>15 OR B>15 THEN step=0.002
240 M=0.1E-30
250 FOR Z=0 TO 2*PI STEP 0.1
260 R=ABS(FNequation)
270 IF M<R THEN M=R+step
280 NEXT Z
290 ENDPROC
300 :
310 DEF PROCplot
320 CLS
330 FOR Z=0 TO 2*PI+step STEP step
340 R=FNequation
350 X%=640+512*COS(A*Z)*R/M
360 Y%=512+512*SIN(B*Z)*R/M
370 IF Z=0 THEN MOVE X%,Y%
380 DRAW X%,Y%
390 NEXT Z
400 ENDPROC
410 :
420 DEF FNequation
430 IF n=1 THEN =1
440 IF n=2 THEN =SIN(Z)
450 IF n=3 THEN =SIN(5*Z)
460 IF n=4 THEN =2*COS(Z)
470 IF n=5 THEN =1+COS(Z)
480 IF n=6 THEN =1+SIN(2*Z)
490 =1+2*COS(2*Z)
```

Listing 4

```
 10 REM Hints & Tips
 20 REM Vertical print
 30 REM by J A Law
 40 REM BBC B/B+/M/E
 50 REM (c) Acorn User
 60 :
 70 PROCassemble
 80 PROCchecksum
 90 MODE 4
100 PROCtest
110 END
120 :
130 DEF PROCtest
140 PRINTTAB(10,20);
150 *LINE Demo
160 PRINT"  of vertical printing."
170 ENDPROC
180 :
190 DEF PROCassemble
200 wrch=&FFEE:osword=&FFF1
210 userv=&200
220 FOR opt%=0 TO 2 STEP 2
230 P%=&900
240 [OPT opt%
250 .sideways
260 CMP #1:BEQ code
270 BRK
280 ]
290 ?P%=255:P%=P%+1
300 $P%="Bad command"
310 P%=P%+LEN$P%
320 [OPT opt%
330 BRK
340 .code
350 STX &70:STY &71
360 LDA #0:TAY:TAX
370 STA &72
380 .clear
390 STA &88,X
400 INX:CPX #8
410 BNE clear
420 .getchar
430 LDY &72
440 LDA (&70),Y
450 CMP #32:BEQ space
460 CMP #13:BEQ end
470 STA &7F
480 LDA #&0A
490 LDX #&7F:LDY #0
500 JSR osword
510 LDX #0:LDY #0
520 .loop1
530 CLC
540 LDA &80,Y:ROL A
550 STA &80,Y
560 LDA &88,X:ROL A
570 STA &88,X
580 INX:CPX #8
590 BNE loop1
600 LDX #0
610 INY:CPY #8
620 BNE loop1
630 LDX #0
640 .loop2
650 LDA &88,X
660 PHA
670 INX:CPX #8
680 BNE loop2
690 LDX #0
700 .loop3
710 LDA #23:JSR wrch
720 LDA #224:JSR wrch
730 .loop4
740 PLA:JSR wrch
750 INX:CPX #8
760 BNE loop4
770 LDA #224:JSR wrch
780 .cursor
790 LDA #8:JSR wrch
800 LDA #11:JSR wrch
810 INC &72
820 JMP getchar
830 .space
840 LDA #32:JSR wrch
850 JMP cursor
860 .end
870 RTS
880 ]NEXT opt%
890 :
900 ?userv=sideways MOD 256
910 ?(userv+1)=sideways DIV 256
920 ENDPROC
930 :
940 DEF PROCchecksum
950 t%=0
960 FOR byte%=&900 TO P%-1
970 t%=t%+?byte%
980 NEXT
990 IF t%<>19468 THEN PRINT"Checksum e
rror; check typing":END
1000 ENDPROC
```

Listing 5

```
 10 REM Hints & Tips
 20 REM By Martin Phillips
 30 REM For BBC B/B+/M/C
 40 REM (c) Acorn User
 50 :
 60 MODE 7
 70 PROCinit
 80 PROCload
 90 PROCrun
100 PROCsave
110 END
120 :
130 DEF PROCinit
140 S%=&3000:E%=S%+4:a%=40
150 b%=44:c%=48:os%=&A00
160 $E%="Has it four legs"
170 E%!a%=E%+c%:E%!b%=E%+2*c%:E%=E%+c%
180 $E%="A dog"
190 E%!a%=0:E%!b%=0:E%=E%+c%
200 $E%="A sparrow"
210 E%!a%=0:E%!b%=0:E%=E%+c%
220 ENDPROC
230 :
240 DEF PROCrun
250 P%=S%+4
260 VDU 26,12
270 PRINT CHR$141; SPC(12); "The Tree
Game"
280 PRINT CHR$141; SPC(12); "The Tree
Game"
290 VDU 28,0,24,39,4
300 PRINT "Are you thinking of an anim
al? ";
310 PROCinput
320 IF A$="N" THEN ENDPROC
330 IF P%!a%=0 THEN PRINT "Is it ";
340 PRINT $P%; " ";
350 PROCinput
360 IF A$="Y" AND P%!a%=0 PRINT "I win
!":I=INKEY(500):GOTO 250
370 IF A$="N" AND P%!b%=0 PROCgetquest
ion:GOTO 250
380 IF A$="Y" AND P%!a%>0 P%=P%!a%:GOT
O 330
390 IF A$="N" AND P%!b%>0 P%=P%!b%:GOT
O 330
400 ENDPROC
410 :
420 DEF PROCinput
430 REPEAT
440 A$=GET$
450 UNTIL A$="Y" OR A$="N"
460 IF A$="Y" THEN PRINT "Yes"' ELSE P
RINT "No"'
470 ENDPROC
480 :
490 DEF PROCgetquestion
500 PRINT "What were you thinking of?"
510 INPUT object$
520 IF LEN(object$)>39 THEN PRINT "Tex
t too long":VDU 7:GOTO 500
530 PRINT "Tell me a question that wil
l distinguishbetween "$P%" and "object$
540 INPUT question$
550 IF LEN(question$)>39 THEN PRINT "T
ext too long":VDU 7:GOTO 530
560 PRINT "What would the answer be fo
r"'$P%
570 PROCinput
580 $E%=$P%:$P%=question$
590 E%!a%=0:E%!b%=0:E%=E%+c%
600 $E%=object$:E%!a%=0
610 E%!b%=0:E%=E%+c%
620 IF A$="Y" P%!a%=E%-2*c%:P%!b%=E%-c
%:ENDPROC
630 P%!a%=E%-c%:P%!b%=E%-2*c%
640 ENDPROC
650 :
660 DEF PROCload
670 CLS
680 PRINT'"Have you a tree to load? ";
690 PROCinput
700 IF A$="N" THEN ENDPROC
710 *LOAD TREE
720 E%=!S%
730 ENDPROC
740 :
750 DEF PROCsave
760 !S%=E%
770 PROCoscli("SAVE TREE "+STR$~S%+" "
+STR$~E%)
780 ENDPROC
790 :
800 DEF PROCoscli($os%)
810 X%=os% MOD 256:Y%=os% DIV 256
820 CALL &FFF7
830 ENDPROC
```

Listing 6

```
 10 REM Hints & Tips
 20 REM By Martin Phillips
 30 REM For BBC B/B+/M/C
 40 REM (c) Acorn User
 50 :
 60 MODE 7
 70 os%=&A00
 80 PROCload
 90 PROCedit
100 PROCsave
110 END
120 :
130 DEF PROCedit
140 VDU 26,12
150 PRINT CHR$141; SPC(10); "The Tree
Game Editor"
160 PRINT CHR$141; SPC(10); "The Tree
Game Editor"
170 PRINT'"Enter new text or press RET
URN"
180 VDU 28,0,24,39,5
190 S%=&3000
200 FOR N%=S%+4 TO E%-1 STEP 48
210 PRINT '" "$N%
220 INPUT temp$
230 IF LEN(temp$)>39 PRINT"Text too lo
ng":VDU7:GOTO 210
240 IF temp$>"" $N%=temp$
250 NEXT N%
260 ENDPROC
270 :
280 DEF PROCload
290 *LOAD TREE
300 E%=!S%
310 ENDPROC
320 :
330 DEF PROCsave
340 !S%=E%
350 PROCoscli("SAVE TREE "+STR$~S%+" "
+STR$~E%)
360 ENDPROC
370 :
380 DEF PROCoscli($os%)
390 X%=os% MOD256:Y%=os% DIV256
400 CALL &FFF7
410 ENDPROC
```

Listing 7

```
 10 REM Hints and Tips
 20 REM Modes 1,2,4 & 5 MC screen dump
 30 REM by Martin Phillips
 40 REM For BBC B/B+/M/C/E
 50 REM (c) Acorn User
 60 :
 70 PROCassemble:MODE 1
 80 PROCcircles
 90 CALL &900
100 END
110 :
120 DEFPROCcircles
130 VDU19,0,4,0,0,0
140 VDU23;8202;0;0;0;
150 VDU29,640;512;
160 FOR N%=100 TO 500 STEP 80
170 FOR T%=-1 TO 1 STEP 2
180 MOVE -N%,0
190 FOR X%=-N% TO N% STEP 8
200 DRAW X%,T%*(SQR(N%*N%-X%*X%))
210 NEXT X%,T%,N%
220 VDU29,0;0;
230 ENDPROC
240 :
250 DEFPROCassemble
260 xlo=&70:xhi=&71:ylo=&72:yhi=&73
270 pixel=&74:byte=&75:bitcount=&76
280 oswrch=&FFEE:osword=&FFF1
290 REM Change to 0 TO 2 STEP 2 once d
ebugged
300 FOR pass=0 TO 3 STEP 3
310 P%=&900
320 [OPT pass
330 LDA #2:JSR oswrch
340 LDA #255:STA ylo:LDA #3:STA yhi
350 LDA #27:JSR printer:LDA #65:JSR pr
inter
360 LDA #8:JSR printer
370 .newline:LDA #0:STA xlo:STA xhi
380 LDA #27:JSR printer:LDA #75:JSR pr
inter
390 LDA #64:JSR printer:LDA #1:JSR pri
nter
400 .newcolumn:LDA #8:STA bitcount
410 .readpixel:LDX #xlo:LDY #0:LDA #9:
JSR osword
420 CLC:LDA pixel:BEQ setbyte:SEC
430 .setbyte:ROL byte
440 LDA ylo:SEC:SBC #4:STA ylo
450 BCS columnend:DEC yhi
460 .columnend:DEC bitcount:LDA bitcou
nt:BNE readpixel
470 LDA byte:JSR printer
480 CLC:LDA #4:ADC xlo:STA xlo:BCC lin
eend:INC xhi
490 .lineend:LDA xhi:CMP #5:BEQendline
500 LDA #32:CLC:ADC ylo:STA ylo:BCCnew
column:INC yhi:BCSnewcolumn
510 .endline:LDA #10:JSR printer
520 .checkend:LDA yhi:BMI end:JMP newl
ine
530 .end:LDA #27:JSR printer:LDA #64:J
SR printer
540 LDA #3:JSR oswrch:RTS
550 .printer:PHA:LDA #1:JSR oswrch:PLA
:JSR oswrch:RTS
560 ]
570 NEXT pass
580 ENDPROC
```

CLASSIC EIGHT BITS

Listing 8

```
10 REM Hints and Tips
20 REM Mode 0 screen dump
30 REM by Martin Phillips
40 REM For BBC B/B+/M/C/E
50 REM (c) Acorn User
60 :
70 PROCassemble:MODE 0
80 PROCcircles
90 CALL &900
100 END
110 :
120 DEFPROCcircles
130 VDU19,0,4,0,0,0
140 VDU23;8202;0;0;0;
150 VDU29,640;512;
160 FOR N%=100 TO 500 STEP 80
170 FOR T%=-1 TO 1 STEP 2
180 MOVE -N%,0
190 FOR X%=-N% TO N% STEP 8
200 DRAW X%,T%*(SQR(N%*N%-X%*X%))
210 NEXT X%,T%,N%
220 VDU29,0;0;
230 ENDPROC
240 :
250 DEFPROCassemble
260 xlo=&70:xhi=&71:ylo=&72:yhi=&73
270 pixel=&74:byte=&75:bitcount=&76
280 oswrch=&FFEE:osword=&FFF1
290 REM Change to 0 TO 2 STEP 2 once d
ebugged
300 FOR pass=0 TO 3 STEP 3
310 P%=&900
320 [OPT pass
330 LDA #2:JSR oswrch
340 LDA #255:STA ylo:LDA #3:STA yhi
350 LDA #27:JSR printer:LDA #65:JSR pr
inter
360 LDA #8:JSR printer
370 .newline:LDA #0:STA xlo:STA xhi
380 LDA #27:JSR printer:LDA #76:JSR pr
inter
390 LDA #128:JSR printer:LDA #2:JSR pr
inter
400 .newcolumn:LDA #8:STA bitcount
410 .readpixel:LDX #xlo:LDY #0:LDA #9:
JSR osword
420 CLC:LDA pixel:BEQ setbyte:SEC
430 .setbyte:ROL byte
440 LDA ylo:SEC:SBC #4:STA ylo
450 BCS columnend:DEC yhi
460 .columnend:DEC bitcount:LDA bitcou
nt:BNE readpixel
470 LDA byte:JSR printer
480 CLC:LDA #2:ADC xlo:STA xlo:BCC lin
eend:INC xhi
490 .lineend:LDA xhi:CMP #5:BEQendline
500 LDA #32:CLC:ADC ylo:STA ylo:BCCnew
column:INC yhi:BCSnewcolumn
510 .endline:LDA #10:JSR printer
520 .checkend:LDA yhi:BMI end:JMP newl
ine
530 .end:LDA #27:JSR printer:LDA #64:J
SR printer
540 LDA #3:JSR oswrch:RTS
550 .printer:PHA:LDA #1:JSR oswrch:PLA
:JSR oswrch:RTS
560 ]
570 NEXT pass
580 ENDPROC
```

Listing 9

```
10 REM Hints and Tips
20 REM Mode 0-6 screen dump
30 REM by Martin Phillips
40 REM For BBC B/B+/M/C/E
50 REM (c) Acorn User
60 :
70 PROCassemble:MODE 0
80 PROCcircles
90 CALL &900
100 END
110 :
120 DEFPROCcircles
130 VDU19,0,4,0,0,0
140 VDU23;8202;0;0;0;
150 VDU29,640;512;
160 FOR N%=100 TO 500 STEP 80
170 FOR T%=-1 TO 1 STEP 2
180 MOVE -N%,0
190 FOR X%=-N% TO N% STEP 8
200 DRAW X%,T%*(SQR(N%*N%-X%*X%))
210 NEXT X%,T%,N%
220 VDU29,0;0;
230 ENDPROC
240 :
250 DEFPROCassemble
260 xlo=&70:xhi=&71:ylo=&72:yhi=&73
270 pixel=&74:byte=&75:bitcount=&76
280 oswrch=&FFEE:osword=&FFF1
290 REM Change to 0 TO 2 STEP 2 once d
ebugged
300 FOR pass=0 TO 3 STEP 3
310 P%=&900
320 [OPT pass
330 LDA #2:JSR oswrch
340 LDA #0:STA xlo:STA xhi
350 LDA #27:JSR printer:LDA #65:JSR pr
inter
360 LDA #8:JSR printer
370 .newline:LDA #0:STA ylo:STA yhi
380 LDA #27:JSR printer:LDA #42:JSR pr
inter
390 LDA #5:JSR printer:LDA #0:JSR prin
ter:LDA #2:JSR printer
400 .newcolumn:LDA #8:STA bitcount
410 .readpixel:LDX #xlo:LDY #0:LDA #9:
JSR osword
420 CLC:LDA pixel:BEQ setbyte:SEC
430 .setbyte:ROL byte
440 LDA xlo:CLC:ADC #2:STA xlo
450 BCC columnend:INC xhi
460 .columnend:DEC bitcount:LDA bitcou
nt:BNE readpixel
470 LDA byte:JSR printer
480 CLC:LDA #2:ADC ylo:STA ylo:BCC lin
eend:INC yhi
490 .lineend:LDA yhi:CMP #4:BEQendline
500 LDA xlo:SEC:SBC #16:STA xlo:BCSnew
column:DEC xhi:BCCnewcolumn
510 .endline:LDA #10:JSR printer
520 .checkend:LDA xhi:CMP #5:BEQ end:J
MP newline
530 .end:LDA #27:JSR printer:LDA #64:J
SR printer
540 LDA #3:JSR oswrch:RTS
550 .printer:PHA:LDA #1:JSR oswrch:PLA
:JSR oswrch:RTS
560 ]
570 NEXT pass
580 ENDPROC
```

Listing 10

```
10 REM Hints & Tips
20 REM by Martin Phillips
30 REM for BBC B/B+/M/C/E (with plus
1)
40 REM (c) Acorn User
50 :
60 MODE 1
70 xmin=400:ymin=200
80 xmax=720:ymax=900
90 PROCassemble
100 PROCcheck
110 PROCtriangles
120 PROCrun
130 END
140 :
150 DEF PROCrun
160 MOVE xmin,ymin
170 DRAW xmax-4,ymin
180 DRAW xmax-4,ymax-4
190 DRAW xmin,ymax-4
200 DRAW xmin,ymin
210 !&80=xmin:!&82=ymin
220 !&84=xmax:!&86=ymax
230 CALL &900
240 ENDPROC
250 :
260 DEF PROCtriangles
270 CLS
280 VDU 19,0,7,0,0,0
290 VDU 19,3,0,0,0,0
300 GCOL 4,3
310 FOR N%=1 TO 10
320 MOVE RND(1500),RND(1500)
330 MOVE RND(1500),RND(1500)
340 PLOT 85,RND(1500),RND(1500)
350 NEXT N%
360 GCOL 0,1
370 ENDPROC
380 :
390 DEF PROCcheck
400 total%=0:target%=26767
410 FOR byte%=&900 TO &9E7
420 total%=total%+?byte%
430 NEXT byte%
440 IF total%<>target% THEN PRINT"Chec
ksum error - please check listing":END
450 ENDPROC
460 :
470 DEF PROCassemble
480 xlo=&70:xhi=&71
490 ylo=&72:yhi=&73
500 pixel=&74:byte=&75
510 bitcount=&76
520 oswrch=&FFEE
530 osword=&FFF1
540 FOR pass=0 TO 2 STEP 2
550 P%=&900
560 [OPT pass
570 :
580 .start
590 LSR &82
600 ASL &82
610 LSR &86
620 ASL &86
630 SEC
640 LDA &86
650 SBC &82
660 STA &88
670 LDA &87
680 SBC &83
690 STA &89
700 LSR &88
710 CLC
720 LSR &89
730 BCC setx
740 LDA &88
750 ADC #127
760 STA &88
770 .setx
780 LDA &80
790 STA xlo
800 LDA &81
810 STA xhi
820 :
830 .setprinter
840 LDA #2
850 JSR oswrch
860 LDA #10
870 JSR printer
880 LDA #27
890 JSR printer
900 LDA #65
910 JSR printer
920 LDA #8
930 JSR printer
940 :
950 .newline
960 LDA &82
970 STA ylo
980 LDA &83
990 STA yhi
1000 LDA #27
1010 JSR printer
1020 LDA #42
1030 JSR printer
1040 LDA #5
1050 JSR printer
1060 LDA &88
1070 JSR printer
1080 LDA &89
1090 JSR printer
1100 :
1110 .newcolumn
1120 LDA #8
1130 STA bitcount
1140 :
1150 .readpixel
1160 LDX #xlo
1170 LDY #0
1180 LDA #9
1190 JSR osword
1200 CLC
1210 LDA pixel
1220 BEQ setbyte
1230 SEC
1240 :
1250 .setbyte
1260 ROL byte
1270 LDA xlo
1280 CLC
1290 ADC #2
1300 STA xlo
1310 BCC columnend
1320 INC xhi
1330 :
1340 .columnend
1350 DEC bitcount
1360 LDA bitcount
1370 BNE readpixel
1380 LDA byte
1390 JSR printer
1400 CLC
1410 LDA #2
1420 ADC ylo
1430 STA ylo
1440 BCC lineend
1450 INC yhi
1460 :
1470 .lineend
1480 LDA &86
1490 CMP ylo
1500 BNE line
1510 LDA &87
1520 CMP yhi
1530 BEQ endline
1540 :
1550 .line
1560 LDA xlo
1570 SEC
1580 SBC #16
1590 STA xlo
1600 BCS newcolumn
1610 DEC xhi
1620 BCC newcolumn
1630 :
1640 .endline
1650 LDA #10
1660 JSR printer
1670 :
1680 .checkend
1690 LDA &85
1700 CMP xhi
1710 BNE new
1720 CLC
1730 LDA &84
1740 SBC xlo
1750 BCC end
1760 :
1770 .new
1780 JMP newline
1790 :
1800 .end
1810 LDA #10
1820 JSR printer
1830 LDA #27
1840 JSR printer
1850 LDA #64
1860 JSR printer
1870 LDA #3
1880 JSR oswrch
1890 RTS
1900 :
1910 .printer
1920 PHA
1930 LDA #1
1940 JSR oswrch
1950 PLA
1960 JSR oswrch
1970 RTS
1980 ]
1990 NEXT pass
2000 ENDPROC
```

Listing 11

```
10 REM Side Print
20 REM By Kieran Connell
30 REM For BBC B/B+/M/C/E/A
40 REM (c) Acorn User
50 :
60 MODE0
70 PROCsetup
80 PROCdemo
90 RUN
100 :
110 DEF PROCsetup
120 DIM blk(7)
130 VDU 23;8202;0;0;0;
140 FOR I%=0 TO 7
150 blk(I%)=2^(7-I%)
160 NEXT
170 ENDPROC
180 :
190 DEF PROCdemo
200 PRINTTAB(35,1);"Side Print"
210 PRINTTAB(35,2);"----------"
220 PRINTTAB(31,4);"By Kieran Connell"
230 INPUT TAB(5,7);"Enter your text >>
>"t$
240 IF t$="" THEN t$=">>>DEMO...DEMO..
.DEMO<<<"
250 PRINTTAB(5,9);"How big do you want
your text ?"
260 x=FNget
270 PRINTTAB(38,9);x;" by ";
280 y=FNget
290 PRINTTAB(43,9);y
300 PRINTTAB(18,12);"WARNING: Make sur
e your Printer is connected!"
310 PRINTTAB(32,14);"Then press SPACE"
320 REPEAT UNTIL GET=32
330 CLS
340 PROCsideprt(t$,x,y)
350 ENDPROC
360 :
370 DEF PROCsideprt(text$,xmag,ymag)
380 VDU 2
390 b$=STRING$(ymag,"#")
400 s$=STRING$(ymag," ")
410 FOR I%=1 TO LEN(t$)
420 A%=10
430 X%=&70
440 Y%=0
450 ?&70=ASC(MID$(t$,I%,1))
460 CALL &FFF1
470 FOR K%=0 TO (7*xmag)+xmag-1
480 PRINT'STRING$(40-(ymag*8)/2," ");
490 FOR J%=8 TO 1 STEP -1
500 IF ?(&70+J%) AND blk(K% DIV xmag)
THEN PRINT b$; ELSE PRINT s$;
510 NEXT
520 NEXT
530 PRINT
540 NEXT
550 VDU3
560 ENDPROC
570 :
580 DEF FNget
590 REPEAT
600 no=GET
610 no=no-48
620 UNTIL no>0 AND no<10
630 =no
```

Listing 12

```
   10 REM Text Formatter
   20 REM by Rob Anderson
   30 REM for any BBC BASIC machine
   40 REM (c) Acorn User
   50:
   60 A$="Hello, this is a text formatti
ng package which enables neat presentati
on of strings. This has applications for
 any programs which require a lot of tex
t output, and enables left, right, centr
e and justify formatting."
   70 B$="Hanging indents are supported,
 along with normal indents. By defining
text windows, text may also be given any
 required left margin, and the line leng
th can also be specified, starting from
1 if required!"
   80 C$="The functions provided work wi
th normal BASIC string variables which a
re passed into the routine as a paramete
r. These routines could be used as part
of an elementary word processor which yo
u may require for a special task."
   90:
  100 MODE 129
  110 PROCformat(0,39,"TEXT FORMATTING R
OUTINE DEMONSTRATION","CENTRE")
  120 PROCformat(0,39,STRING$(37,"="),"C
ENTRE")
  130 VDU28,0,24,39,4;14
  140 PROCformat(0,39,"< press SHIFT to
scroll >","CENTRE")
  150 PRINT
  160 COLOUR2
  170 PROCformat(5,39,A$,"RIGHT")
  180 PRINT
  190 COLOUR 3
  200 PROCformat(-10,30,B$,"JUSTIFY")
  210 PRINT
  220 COLOUR2
  230 PROCformat(0,39,C$,"CENTRE")
  240 END
  250:
  260 DEFPROCformat(ind%,ll%,A$,format$)
  270 LOCAL width%,tc%,start%,line$,hi%,
lc%,W$,B$
  280 width%=ll%
  290 IF ABS(ind%) >=ll% OR ll%<1 OR A$=
"" PRINT "Parameter Range Error.":VDU7:E
NDPROC
  300 tc%=0
  310 start%=TRUE
  320 line$=""
  330 IFSGN(ind%)=1 hi%=FALSE:lc%=ind%:l
ine$=STRING$(ind%," "):ind%=0 ELSE ind%=
ABS(ind%):hi%=TRUE:lc%=0
  340 REPEAT
  350 W$=""
  360 REPEAT
  370 tc%=tc%+1
  380 B$=MID$(A$,tc%,1)
  390 W$=W$+B$
  400 UNTILB$=" "ORtc%=LENA$
  410 IF RIGHT$(W$,1)=" " AND W$<>" " W$
=LEFT$(W$,LENW$-1)
  420 IF start% AND LEN W$+lc% > ll% lin
e$=line$+LEFT$(W$,ll%-lc%):W$=RIGHT$(W$,
LEN W$-ll%+lc%):lc%=ll%
  430 start%=FALSE
  440 lc%=lc%+LENW$
  450 IFlc%>ll% PROCprintline(format$):l
ine$=STRING$(ind%," "):lc%=LEN W$:IF hi%
 hi%=FALSE:ll%=ll%-ind%
  460 IF LENW$>ll% PROCprintbigword ELSE
 line$=line$+W$
  470 IF lc%+1<=ll% AND W$<>" " line$=li
ne$+" ":lc%=lc%+1
  480 UNTIL tc%=LEN A$
  490 PROCprintline(format$)
  500 ENDPROC
  510:
  520 DEFPROCprintbigword
  530 LOCAL A%
  540 line$=line$+MID$(W$,0,ll%)
  550 FORA%=ll%+1 TO LEN W$ STEP ll%
  560 PROCprintline(format$)
  570 line$=STRING$(ind%," ")+MID$(W$,A%
,ll%)
  580 NEXT
  590 lc%=LEN W$ MOD ll%
  600 IF lc%=0 lc%=ll%
  610 ENDPROC
  620:
  630 DEFPROCprintline(format$)
  640 IF LENline$<width% line$=line$+STR
ING$(width%-LENline$," ")
  650 IF format$="RIGHT" PROCalignright
  660 IF format$="CENTRE" PROCcentre
  670 IF format$="JUSTIFY" PROCjustify
  680 PRINT line$
  690 ENDPROC
  700:
  710 DEFPROCalignright
  720 REPEAT
  730 IF RIGHT$(line$,1)=" " line$=" "+L
EFT$(line$,LENline$-1)
  740 UNTIL RIGHT$(line$,1)<>" "
  750 ENDPROC
  760:
  770 DEFPROCcentre
  780 LOCAL pointer%,C%,spaces%
  790 pointer%=width%+1
  800 C%=-1
  810 REPEAT
  820 pointer%=pointer%-1
  830 C%=C%+1
  840 UNTIL MID$(line$,pointer%,1)<>" "
OR C%=ll%
  850 spaces%=C% DIV 2
  860 line$=STRING$(spaces%," ")+line$
  870 line$=LEFT$(line$,LEN line$-spaces
%)
  880 ENDPROC
  890:
  900 DEFPROCjustify
  910 LOCAL pointer%,C%,spaces%,point%
  920 pointer%=width%+1
  930 C%=-1
  940 REPEAT
  950 pointer%=pointer%-1
  960 C%=C%+1
  970 UNTIL MID$(line$,pointer%,1)<>" "
  980 IF C%=0 ENDPROC
  990 pointer%=-1
 1000 REPEAT
 1010 pointer%=pointer%+1
 1020 UNTIL MID$(line$,pointer%,1)<>" "
 1030 point%=pointer%
 1040 spaces%=C%
 1050 IF INSTR(MID$(line$,point%,(width%
-C%)-point%)," ",0)=FALSE ENDPROC
 1060 REPEAT
 1070 REPEAT
 1080 pointer%=pointer%+1
 1090 IF pointer%=(width%-C%)+1 pointer%
=point%
 1100 UNTIL MID$(line$,pointer%,1)=" "
 1110 line$=LEFT$(line$,pointer%)+MID$(l
ine$,pointer%,width%-pointer%)
 1120 REPEAT
 1130 pointer%=pointer%+1
 1140 UNTIL MID$(line$,pointer%,1)<>" "
 1150 C%=C%-1
 1160 UNTIL C%=0
 1170 ENDPROC
```

Listing 13

```
   10 REM VIEW Splice
   20 REM by Andrew Pillidge
   30 REM for B/B+/E/M/C + VIEW
   40 REM (c) Acorn User
   50 :
   60 MODE 6
   70 elk=1
   80 IF INKEY-256=elk THEN mkr1=&0054 E
LSE mkr1=&0053
   90 mkr2=mkr1+2
  100 cpr=&0008
  110 z=&90
  120 FOR pass=0 TO 3 STEP 3
  130 P%=&900
  140 [OPT pass
  150 LDY #0
  160 LDA mkr1
  170 STA z
  180 STA z+8
  190 LDA mkr1+1
  200 STA z+1
  210 STA z+9
  220 CMP #0
  230 BNE mark2
  240 RTS
  250 :
  260 .mark2
  270 LDA mkr2
  280 STA z+2
  290 STA z+10
  300 LDA mkr2+1
  310 STA z+3
  320 STA z+11
  330 CMP #0
  340 BNE toploop
  350 RTS
  360 :
  370 .toploop
  380 LDA (z),Y
  390 BEQ top
  400 JSR inctext
  410 JMP toploop
  420 :
  430 .top
  440 JSR inctext
  450 LDA z
  460 STA z+4
  470 STA z+12
  480 LDA z+1
  490 STA z+5
  500 STA z+13
  510 :
  520 LDA z+8
  530 STA z
  540 LDA z+9
  550 STA z+1
  560 :
  570 .loop
  580 LDA (z),Y
  590 STA (z+4),Y
  600 CMP #128
  610 BPL end
  620 CMP #11
  630 BEQ end
  640 JSR inctext
  650 JSR incptr
  660 LDA z
  670 CMP z+2
  680 BNE loop
  690 LDA z+1
  700 CMP z+3
  710 BNE loop
  720 :
  730 .splice
  740 LDA z+8
  750 STA z
  760 LDA z+9
  770 STA z+1
  780 LDA z+12
  790 STA z+4
  800 LDA z+13
  810 STA z+5
  820 LDY #0
  830 :
  840 .text1
  850 LDA (z+4),Y
  860 STA (z),Y
  870 CMP #13
  880 BEQ text2
  890 JSR inctext
  900 JSR incptr
  910 JMP text1
  920 :
  930 .text2
  940 LDA #9
  950 STA (z),Y
  960 JSR inctext
  970 JSR incptr
  980 :
  990 .loopt2
 1000 LDA (z+2),Y
 1010 STA (z),Y
 1020 STA z+6
 1030 JSR inctext
 1040 CLC
 1050 LDA z+2
 1060 ADC #1
 1070 STA z+2
 1080 LDA z+3
 1090 ADC #0
 1100 STA z+3
 1110 LDA z+6
 1120 CMP #13
 1130 BNE loopt2
 1140 :
 1150 LDA z+2
 1160 CMP z
 1170 BNE text1
 1180 LDA z+3
 1190 CMP z+1
 1200 BNE text1
 1210 :
 1220 LDA mkr1
 1230 STA cpr
 1240 LDA mkr1+1
 1250 STA cpr+1
 1260 LDA #0
 1270 STA mkr1
 1280 STA mkr1+1
 1290 STA mkr2
 1300 STA mkr2+2
 1310 .end
 1320 RTS
 1330
 1340 .inctext
 1350 CLC
 1360 LDA z
 1370 ADC #1
 1380 STA z
 1390 LDA z+1
 1400 ADC #0
 1410 STA z+1
 1420 RTS
 1430 :
 1440 .incptr
 1450 CLC
 1460 LDA z+4
 1470 ADC #1
 1480 STA z+4
 1490 LDA z+5
 1500 ADC #0
 1510 STA z+5
 1520 RTS
 1530 ]
 1540 NEXT pass
 1550 *SAVE SPLICE 0900+E6
```

NOTES

BBC ACORN USER

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MORE STOCK JUST IN!

OFFER OF THE MONTH

THE FANFARE FIVE-LANGUAGE POCKET TRANSLATOR

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Superbly styled and easy-to-use, the Translator contains over 7,000 words across five languages.

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Offer Price £29.95



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Sam6 — *Galaforce 2, Hunchback, Hopper, The Sentinel (BBC), Video's Revenge (Electron)*

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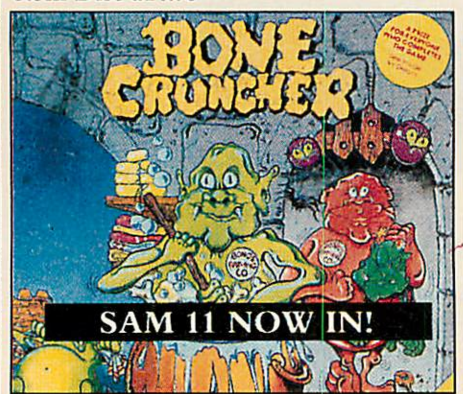
Sam8 — *Winter Olympiad 88, Quest, Around The World In 40 Screens, Mr. Wiz*

Sam9 — *Camelot, Steve Davies Snooker, Spycat, The Life Of Repton*

Sam10 — *Repton Thru Time, 3D Dotty, Zalaga, Qwak*

Sam11 — *Barbarian, Pipeline, Baron, Monsters*

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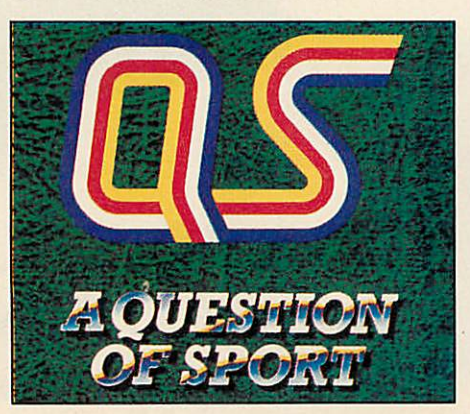
With David Coleman asking the questions and Ian Botham and Bill Beaumont heading up the teams, you can pit your wits against your family and friends, or even challenge your BBC micro.

There are six exciting and fast-moving rounds, including Pictureboard, Mystery Personality and a Quickfire round.

If you've always fancied yourself as a bit of a sports fanatic, this is the program that will thoroughly test your knowledge.

Order your copy today and see if you can beat the professionals at their own game.

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The computer version of *Trivial Pursuit* is faithful to the original board game. The object being to travel around the board answering questions and trying to collect a wedge for each of the six subjects.

The questions are asked by a cute character called TP, while the screen layout shows the board along with the progress of each player.

Don't worry about running out of questions. There are enough in this set to keep you wracking your brains through many sessions.

And for as little as £14.95 we'll send you the complete set of Trivial Pursuit games, including Genus, Baby Boomer and Young Players.

	Cassette	5.25in Disc
RRP	£44.85	£59.85
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ARCHIMEDES

ZARCH

David Braben, author of *Zarch*, is also the co-author of the unanimously acclaimed game *Elite* – probably the world's highest selling computer game.

After months of program development work, David finally harnessed the speed and performance of the Archimedes computer to create another programming masterpiece.

Zarch is unlike any game you have ever seen before. Even the demonstration program, *Lander*, supplied on the Archimedes Welcome disc, can only give the most basic idea of the features and fascination that *Zarch* has in store.

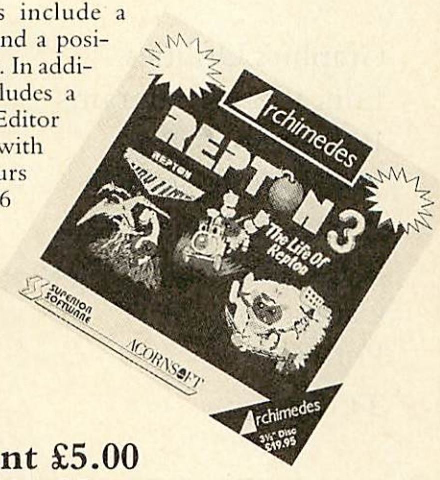
The three-dimensional landscape is realistically portrayed by skilful use of 256 colours, area shading and accurate perspective design. The multi-directional smooth-scrolling movement is also enhanced by the use of twin screens: one is viewed while the other is updated.

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Offer Price £14.95

REPTON 3

The Repton series of games is the most successful software ever published for the BBC micro and Electron computers and has been described as 'The thinking man's arcade game'.
Now, a massive enhanced version is available for the Archimedes, comprising four complete games:
* REPTON 3 * THE LIFE OF REPTON * AROUND THE WORLD IN 40 SCREENS * REPTON THRU TIME

Enhanced features include a choice of four tunes and a position save/recall facility. In addition the software includes a sophisticated Screen Editor and Character Editor with a choice of 16 colours from a total of 4,096 hues. Plus you can design new screens and immediately test them by entering the game section.



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BBC MICRO / MASTER / ELECTRON

RICOCHET

Ricochet has an amazing 330 different action-packed screens arranged over five levels. You get five games in one, since each level has its own distinctive theme, with superb graphics and unusual puzzles to solve.

You control SPRAT, the Small Partially Robot Alien Time-traveller, in his quest to collect the five hourglasses from the five worlds of *Ricochet*.

SPRAT can roll left and right and up and down ladders and ropes, but his unique ability is that he can jump to different heights and in different directions. You have to control the fast-moving alien as he ricochets through the levels.



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RRP	£9.95	£11.95	£14.95
BAU Discount	£2.00	£2.50	£3.00
Offer Price	£7.95	£9.45	£11.95

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Once installed you can call it from your own programs with simple-to-use commands. Plus you can fully configure it to speak in any accent or pitch.

And you can teach it how to pronounce unusual words and phrases – adding them to the built-in dictionary – customising ***Speech!*** to your own requirements.

Due to a bulk purchase we can offer this unique program to you for less than half price. But place your order soon as they're sure to be in high demand.

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RRP	£9.95	£11.95	£14.95
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Please note: ***Speech!*** is not compatible with the Electron

The program is not supplied in its original packaging but is complete and fully working.

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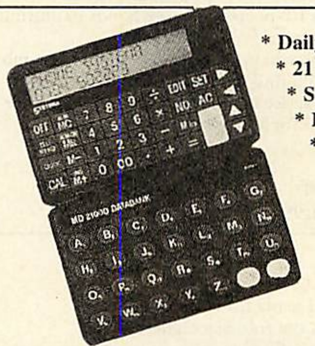
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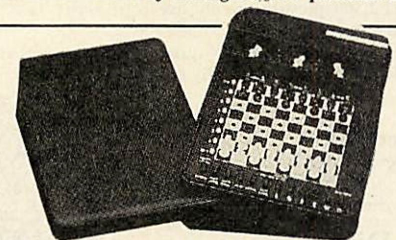
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And the best news of all is that for a limited period we have reduced the price of this unique device by £10. For just £39.95 you'll have one of the easiest, cheapest and most secure means of managing your personal data.



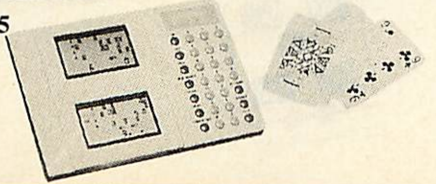
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If you can't make up a bridge foursome, try the Dual Screen Bridge Computer

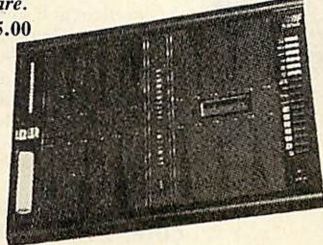
Only slightly larger than a paperback book, yet featuring 28 keys and two displays, the Dual Screen Bridge Computer is the ideal way for you to practice bridge.
Targeted at beginners to intermediate players it will help you improve your skills of bidding, playing and recall. While, if you are an advanced bridge player, the Bridge Computer will help you to keep your hand in.
And for just £49.95, saving £10 off the recommended price, you're sure to find it helps your bridge playing to improve — as well as being a fun pastime you can play anywhere.

*** 4 levels of play**
*** Plays 3 hands**
*** Random cards generated for each hand**
*** You bid against the computer**
*** You can be dummy, declarer or defender**
*** Checks for and disallows illegal play**
*** Displays your cards, the dummy's hand, bidding, playing and vulnerability, and the results of contracts and tricks**
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The go-anywhere Pocket Chess Plus Computer

This is a truly pocket sized chess computer featuring a touch sensitive board so you can forget about entering fiddly coordinates because the Pocket Plus knows where you move each piece.
It comes with a comprehensive coaching facility which teaches tactical manoeuvres, warns you if a piece is in danger and even shows you its thinking.
Programmed with several difficulty levels, whether you are a beginner or a master, the Pocket Plus will give you a challenging game — every time. And it even remembers the state of play when you switch it off.
Normally the Pocket Plus sells for £34.95, but if you buy it from us we'll knock £5 off the recommended price. For just £29.95 you're guaranteed hours of enjoyment — where ever you are.
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Save £15 on the Saitek Sensory Backgammon Computer

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Can you compete with human and computer managers to successfully steer your team through the season, using your skill to make it stronger as you proceed?
With the program you get a large playing board, over 100 player cards, stacks of money, some counters and a comprehensive instruction manual. And for only £7.99 you're guaranteed hours of inexpensive yet intense, action-packed excitement!

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Colossus 4 Bridge

Colossus Bridge allows one player to play a complete game of bridge with the computer controlling the other three hands. Each hand is bid according to the Acol system, while other standard conventions are also available.
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Your objective is to capture the enemy headquarters, which will require the planned strategic deployment of your forces and regular fire duels between your own and enemy units.
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Colossus perfectly understands the rules of chess and can handle all standard mates, while offering you the choice between a two- dimensional flat board or a stunning 3D display.
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OPEN PLAN

Although it may be dificult to decide exactly what type of program it is, **DAVE FUTCHER** discovers Circle Software's Premier is an impressive beast anyway

Is it a bird? Is it a plane? *Premier* is a little like that. Is it a wordprocessor? Is it a report generator? Is it a database? In fact *Premier 3* is really none of these things but spans them all and lots of other applications too.

The difficulty in deciding exactly what *Premier 3* is occurs because it is capable of so many things it is hard to find a single category to define it under.

Three things are certain. First, *Premier* is a dynamic, open ended package and intended for user adaptation. It is also capable of a wide variety of text manipulation activities but calling it a text processor hardly seems to do it justice. Third, it is a fully multi-tasking Risc OS application, it uses the full Wimp window system and is capable of displaying any number of documents or files in separate windows.

A wordprocessor?

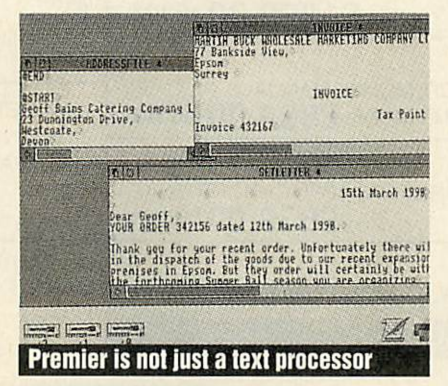
At the core of *Premier* is a wordprocessor with built-in functions for inputting, editing, formatting, printing, saving and loading text.

When earlier versions of *Premier* (prior to version 2.5) were released the wordprocessor was particularly limited as it did not even have word wrap but it has now grown into quite a powerful wordprocessor in its own right.

But don't confuse *Premier* with DTP type packages like Computer Concepts' *Impression*. It does not use 'fancy fonts' but sticks with the Acorn system fonts. Neither does it have any facilities to include graphics like *First Word Plus* or *Pipedream 3*.

However, *Premier* is ideal for situations where plain text documents are required with text styles like bold, italic, sub- or super-script and underline – probably the majority of applications anyway.

If you wish to use your Archimedes or A3000 with a daisywheel printer *Premier* is ideal, which is more than can be said for all those new packages that rely on graphical output methods. This is because it does not have to use the normal Acorn printer drivers. So if you are using a dot-matrix printer *Premier* will provide a very fast, good quality output.



Premier is not just a text processor

Premier is loaded in the now traditional Risc OS manner – you click the *!Premier* icon (a scroll and quill) from the desktop after cataloguing the disc, causing the icon to appear on the icon bar after loading.

An existing file is loaded by dragging its icon from a directory viewer onto the *!Premier* icon on the Icon Bar.

A new document can be started by clicking the menu button over the *!Premier* icon and selecting the Create option. This produces a sub-menu with a range of file types and Text is selected to create a standard text file.

You are then offered the standard *Premier* command entry window containing the text claret and you are asked to enter a document name. When this is done a new window with the given name is placed on the screen ready for text input.

Saving files could not be easier. The menu button is clicked anywhere in the text window and the Save option is selected. This causes the Filer window to be displayed and from here the file icon can be dragged to a suitable directory or the filename edited to provide a suitable directory path. All very Risc OS.

Documents are created with a default page size that corresponds to A4 with 72 lines and 80 columns. The page margins in this area are set to give a header and footer space of three lines, a perforation skip area of six lines, while the column margins are set at five and 75 characters, which gives a text area of 60 lines and 70 columns.

Up to 16 tab stops may be set and by default these are at eight column intervals. Documents with different formats – page size, margins and tabs stops are easy to produce and are the basis of something that *Premier* calls a format file which is resident in the Commands directory.

Paragraphs are not formally recognised within *Premier*, instead any number of blank

lines may be entered between paragraphs using RETURN. Within a *Premier* document text will automatically word wrap at the right- hand margin. When a new line has to be forced this is done by pressing RETURN and a new line character is displayed.

Strangely there is no built-in command that enables justification to be switched on and off but this can be remedied by defining the global formatting for the document so that all the text is formatted. Another possibility is to write a *Premier* macro to do the formatting dynamically.

Premier has a powerful set of Find and Replace commands that are available from a window when function key f4 is pressed. Unusually, *Premier* is capable of searching both forward and backwards.

All the usual cut and paste facilities are also available from the function keys or from menus. You can move an area of text that has been marked to the claret position. Similarly an area of text can be copied to another position.

Dynamic text

The unique feature of *Premier* is the concept of dynamic text. Normal text files created with *View* or *First Word Plus* contain text which is fixed at the time it is entered and cannot be changed without editing the file.

However, these edited changes themselves become permanent, unless some more editing takes place.

Dynamic text is different. You may alter text after it has been entered. The idea has its roots in spreadsheet programs where each slot on the sheet can display a variable which is usually the result of computing a formula based on the result of the contents of other slots on the same spreadsheet.

In *Premier* the idea is extended from the spreadsheet into a text document without the constraints of all the rows and columns. The spreadsheet's formula concept is expanded to contain sequences of commands as well as many separate calculations.

This essentially means that variables and system or user defined functions can be placed within the text file and interpreted at the time of printing or spooling. In reality, the text you create with *Premier* contains a mixture of fixed and dynamic text.

By using dynamic text it is possible to ensure a letter head may always contain today's date or, at a more complex level, you could set up mail merging to print personalised letters and adding names and addresses from another file. Similarly, you could print standard invoices where data is read out of a previously created datafile.

Programming language

The use of *Premier's* programming language is vital if you want to do more than just run pre-defined applications. This is the real key to the program's power. However, this also means that if you cannot program, *Premier* is not the best choice of package for you.

This simple command language is used to control all *Premier* functions. Simple commands can be entered at the keyboard for direct execution or more complex commands can be typed into a command window either for immediate execution or for saving to disc for future use.

Any sequence of commands can be combined into groups which are then called 'macros' – rather like procedures within BBC Basic, Pascal or other structured languages. These macro commands can be assigned to any key for instant execution.

The *Premier* command language has well over a 100 commands and system variables available within it.

Single commands enable files to be loaded and saved, windows created and particular text strings can be searched for. Variables and constants of the same type (either integer or string) may be combined using mathematical or string operators.

In addition multiple commands may be executed only when some condition is true or false. These commands can be repeated any number of times.

The language is documented thoroughly in the comprehensive 220 page User Guide and Reference Manual.

Usefully much of the manual is written as an informal tutorial but unfortunately the examples given are really just illustrations of the way the various commands may be used.

It's a great shame that Circle Software doesn't provide any worked programs (other than the wordprocessor itself) so that the real power for creating applications that *Premier* has can actually be seen and emulated by users.

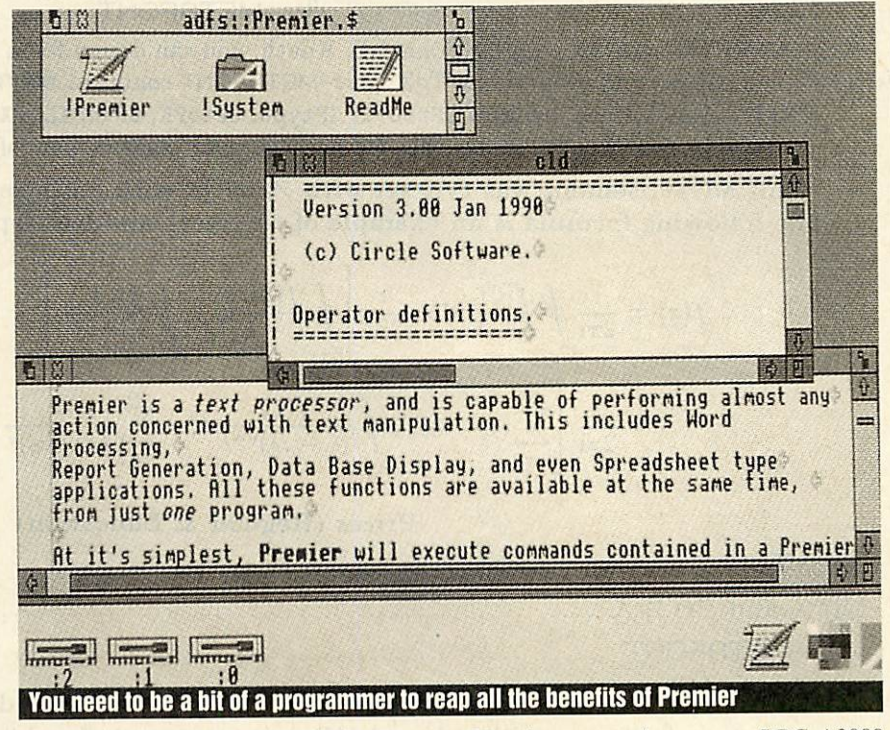
Conclusions

If you are looking for an open ended package for doing all manner of text processing tasks, *Premier* is certainly the answer. There is nothing else like it. The programming language and dynamic text offer tremendous possibilities for user adaptation.

Premier 3 is certainly capable of many functions traditionally requiring several software packages.

However, it is less clear how many users will be sufficiently interested in learning to program a package like *Premier* to actually achieve its potential.

We live in an age when computer software is expected to 'load and go'. How many users actually make any use of the wonderful programming language built into *Wordwise Plus*, beyond small utilities published in magazines? How many use the *System Delta* database language beyond the card index application supplied with it?



You need to be a bit of a programmer to reap all the benefits of Premier

(For that matter, how many BBC A3000 owners do any Basic programming that is more complex than typing in the *BAU* yellow pages?)

When Circle Software or third parties produce a set of ready written applications for mail merging, label printing, invoicing and data handling, this very clever but over-open package will sell.

Premier 3 *costs £138 from Circle Software, 33 Restrop View, Purton, Swindon SN5 9DG. Tel: (0793) 770021*

JACK OF ALL TRADES

With his Arc fully under control, **DAVE ACTON** comes up for air to examine Instigator from Dabs Press

Instigator is described by Dabs Press as 'The Archimedes System Manager' which is an appropriate title for a large and mixed bag of utilities. *Instigator* is supplied as a module. Dabs has provided a desktop front end, although the better features are best used outside the desktop environment. Nobody really needs a disc sector editor in a window.

The module contains a few major tools and a wide selection of minor ones – some genuinely handy to have and some are simply fillers.

The disc sector editor provides a clear display of the raw contents of a disc and allows you to alter them on a byte-by-byte basis. A separate command is provided to allow you to search a disc for a pattern of characters. If found, the editor is entered at the appropriate place.

Provision is made for the reading of non-standard discs through the use of system variables – a thoughtful addition. It should be possible to edit the Ram disc but I had some problems. Dabs is investigating this and will provide free upgrades for customers if the bug is confirmed.

Two other important features of *Instigator* which go hand-in-hand are the memory editor and disassembler. The former is similar to the disc editor – providing a clear and speedy means of examining and editing the contents of Ram.

The disassembler uses colour to distinguish between SWI calls, branches and other instructions – nice. Switching between editor and disassembler is as simple as pressing the COPY key.

The line editor is a facility popular with those users that spend a lot of time in Basic or at the star prompt. It can be permanently enabled, allowing you much more control when it comes to entering commands.

It is effectively a one-line wordprocessor. This, like many of the features of *Instigator*, is not really designed for desktop use. I often use *!Edit* task windows for entering star commands and the line editor (for very understandable reasons) cannot be used then.

If you prefer to live outside the desktop though, the command archiving facility makes the line editor even more usable. Essentially you can set aside some memory as a buffer for all your previously entered star commands and skip through them as you wish.

This can be a real time saver, particularly as you may specify a search string when recalling old commands.

An even more sophisticated enhancement is provided in the form of 'cut and paste'. This is a sort of 'super' COPY key whereby the mouse can be used to select a piece of text somewhere on the screen for re-entry.

Instigator has its own window system – a fairly primitive affair in these days of multi-tasking. However, I'm sure it will be of some use to people working outside the desktop and needing the ability to 'pop up' boxes on the screen and remove them neatly.

There are numerous minor star commands provided by *Instigator* – too many to list them all but here are some of the more useful or imaginative ones.

Commands are provided to load and save function key definitions, operating system variables and the CMos Ram.

There is a *TIDY which, unlike *COMPACT continues to sort out the contents of a disc until there is just one block of free space left. *BLIST takes a Basic program and lists it out as a text file (this is not something needed every day but I've personally required such a facility in the past and am very glad it's here).

Many file commands are included such as *LOCATE which will find a file for you and display its full pathname. *XINFO and *XCAT are enhanced versions of *INFO and *CAT that search a directory structure recursively and, if needed, will only present information about files of a particular type. Of course, no utility package would be complete without a screen compressor and *Instigator*'s is adequately (though not remarkably) efficient at squashing images.

The *DIMMER command is also handy – causing the screen to be switched off after a given period of keyboard/mouse inactivity.

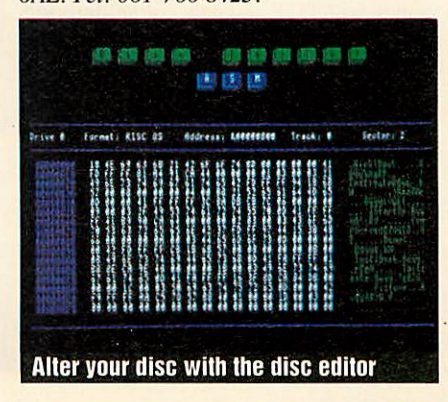
The manual, incidentally, is excellent – a hallmark of Dabs Press. Other manufacturers please take note of what documentation should look like. A demo disc and quick reference card complete the package.

In conclusion, *Instigator* is a nice little bag of bits and pieces. I'm sure I will be using some of its facilities in the future and aside from a few minor anomalies, *Instigator* should win fans – particularly among 'nuts-and-bolts' programmers that like rummaging around.

At a fraction under £50 I feel that *Instigator* is neither cheap nor over expensive for those who go for this sort of thing.

Instigator *costs £49.95 from Dabs Press, 5 Victoria Lane, Whitefield, Manchester M25 6AL. Tel: 061-766 8423.*

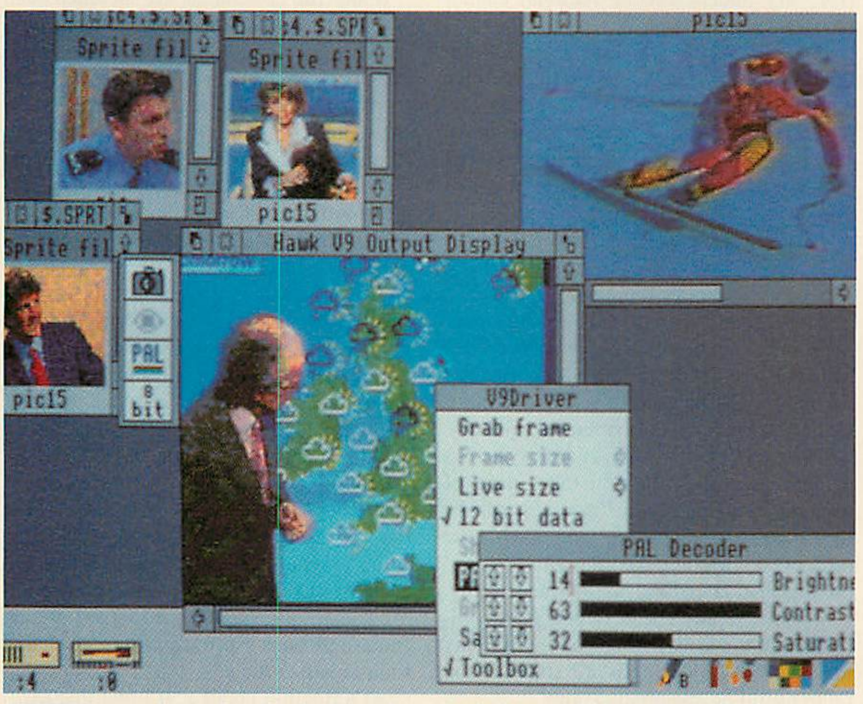
The Instigator Tools menu



Alter your disc with the disc editor

BIRDSEYE VIEW

ROB MILLER casts a covetous eye over the Hawk V9 – the latest colour video digitiser for the Archimedes



Products for the Archimedes seem to come in bursts. No sooner is the first of a type of product released, than a flood of similar products appear on the market. It's already happening with DTP and now colour digitisers appear to be getting the same treatment.

Hot on the heels of the Pineapple colour digitiser (see the review in April's *BAU*) comes the Hawk V9 from Wild Vision. Looking similar to Pineapple's, the Hawk V9 comes as a full-width podule that fits into an Archimedes via the backplane. The digitiser will therefore require the space usually occupied by two podules and, of course, a backplane for 300 series users.

Manufacture of the board is to a very high standard with no sign of 'bodge' wires needed for last-minute tweaking. The backplate could have been fixed more securely to the circuit board – at present it only has a link at either end of the board making it rather flexible.

However, the problem is overcome once the board has been fitted inside the Archimedes and shouldn't cause any problems unless the podule is to be inserted/removed a number of times.

The *Fastgrab* software for the digitiser is supplied on disc as a desktop application. It contains all the code required to grab from a video source, plus *ChangeFSI*, which is the image manipulation utility written by Acorn's Roger Wilson.

The software runs in any mode supported by the desktop although mode 15 is fastest. As it's a 256 colour picture that is grabbed, any different mode (such as mode 12) will need to convert the palette and/or aspect ratio and so slow down operation.

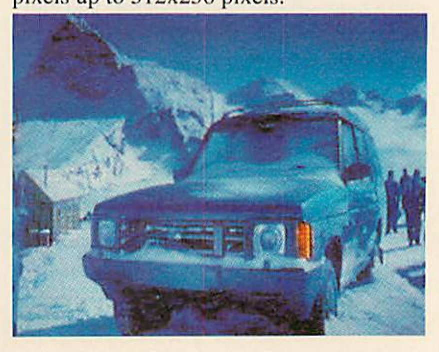
Running *Fastgrab* is just a case of double clicking on the application icon to install it on the icon bar. If a video signal is present, a small window appears on the screen with a live representation of the current picture.

Like *!Draw* on the application disc supplied with the Arc, the *Fastgrab* software uses a toolbox for the more common functions. The usual menu (selected with the menu button) can also be called up to access the commands.

All the Risc OS standards are adhered to, making it easy to operate even for people with little experience.

To obtain the best picture, you can alter the colour brightness, saturation and contrast. Unlike the Pineapple digitiser this is done via software. Small slider-bars (similar to those in the desktop palette) are used to adjust between values. The new settings can be saved to disc to make setting up simpler at a later date. A default icon returns the brightness, contrast and saturation to average levels.

The first option in the main toolbox, denoted by a camera icon, is the grab. When the desired picture is shown in the 'viewing window', clicking on this will freeze the action and display the grabbed picture in a 'display window'. Both view and display windows can be altered in size from 128x64 pixels up to 512x256 pixels.



Changing the size of the view window slows down the screen update and so it is best to use the smaller option when grabbing from fast action motion such as sports events. People with freeze frame on their videos can of course use the larger format.

Because *Fastgrab* is a desktop application, it is possible to run other software (as long as there is sufficient memory available) concurrently. Not surprisingly, real-time digitising takes a sizeable chunk of the processor's time and slows down other applications noticeably. Even the mouse pointer has difficulty getting around the screen occasionally.

Fortunately, it's possible to alter the proportion of the processor's time used for *Fastgrab* by means of a slider bar. However, this does not affect the time taken to grab an image so freeze frames are still possible at the lowest setting.

Like the main *Fastgrab* window, the display option has its own toolbox. This allows you to manipulate the frame in a number of ways, including processing with *ChangeFSI*, saving to disc as an 8-bit per pixel sprite or saving to disc as a 12-bit per pixel datafile. The latter uses a large amount of disc space (192K), so it's only possible to save four files of this type on one disc.



Altered images

Those who have been following Dave Knell's series on image processing in *BBC Acorn User* will already be familiar with some of the principals involved with this seemingly complicated area of computer science. Rather than explain in detail each feature of *ChangeFSI*, I'll just give a brief outline of each one. A copy of the Public Domain version of *ChangeFSI* is also included on this month's (July 1990) 3.5in disc so readers can 'try before they buy'.



ChangeFSI is an image processing program written by Roger Wilson (the 'Father of the Arc') at Acorn. It is designed to allow pictures (including those from different computers such as the IBM PC) to be loaded on the Archimedes and processed in a number of ways.

One of the most important features is the ability to convert screens from any graphics mode to any other. If you wanted mode 12 grey-scaled sprites, you can grab in mode 15 and then get *ChangeFSI* to change them. Colour mode 12 (or any other 16 colour mode) pictures can also be produced by reducing the number of bits per pixel used, although the resulting image is not as clear as that obtained using a grey scale.

Excellent mode 0 pictures can also be produced so it would be possible to convert them for use on a standard BBC micro.

As well as converting screens between modes, *ChangeFSI* can be used to enhance images. Range expansion, equalisation and sharpening of pictures are all possible. Equalising a picture causes detail to be 'brought-out'. Sharpening can be used for edge-detection.

Horizontal and vertical flips are provided to allow images to be inverted in the x and y axes. Both colour and monochrome pictures can be reversed (like negative photographs) with the invert option.

All options within *ChangeFSI* are set via 'radio' buttons, again conforming to the Risc OS standard. Once you're happy with the parameters, clicking on an OK icon starts the conversion.

Due to the complexity of *ChangeFSI*, it can take a while to process a picture so an option has been provided to allow processing to take place in mode 1. This requires less microprocessor time and so speeds things up considerably.

When the conversion has finished, *ChangeFSI* reverts to mode 15 (or whatever mode you start in) when it has finished and displays the resultant sprite. This can be saved to disc or dragged to an art program such as *!Paint*.

The software supplied with the Hawk V9 is what makes it stand out. It complies to the Risc OS standard completely and so it is simple to operate by anyone at all familiar with the desktop environment. The fact that everything is controlled under software means that future upgrades will just be a case of changing discs. The manual is clearly laid out and simple to follow. The 'teccy' bits such as *SWI* call details and specifications are put at the end to avoid initial confusion, inherent in most computer documentation.

There are only two minor criticisms against the Hawk V9. First, you can only digitise square pictures so any source such as a television or video recorder is clipped. However, an adjustable pot is provided on the back of the podule to move the area to be digitised left or right by a small amount.

Secondly, the price (£339+VAT) is considerably more than the Pineapple digitiser, although the current software is better.

Let's hope that the Hawk V9 gives Wild Vision the attention it deserves for supporting the Archimedes with such excellent hardware and software.

The Hawk V9 colour digitiser costs £389.85 from Wild Vision, 6 Jesmond Road, Newcastle Upon Tyne NE2 4PQ. Tel: 091-281 8481.



WELL WORDED

TeX provides an entirely different way of presenting words on a page as DAVID LAWRENCE has discovered

The current battle between the major Archimedes software houses seems to be to produce the 'ultimate' typesetting and desktop publishing system. All of the programs now, or shortly, available are based around a similar concept:

A blank page is displayed on the screen onto which a number of boxes or 'frames' can be dragged. Text, in a variety of fonts, can then be placed in these frames either directly from the keyboard or imported from a file. Line images (output from *!Draw*) or bit maps (output from *!Paint*) can also be included in these pages.

TeX copes well with equations

The resulting pages can then be printed out using whatever printer is currently attached by means of one of the Risc OS printer drivers.

Using this page make-up method combines quick and easy page layout with a near full Wysiwyg display. The Risc OS font manager works in such a way that its fonts are used on screen and by the printer.

However, some people consider this system to be rather limited – it is often not easy to specify precisely what output you want and, indeed, some desired results may actually be impossible for the system to produce. Of course, there is no easy way to get round this problem completely – total flexibility and ease-of-use are difficult to combine.

TeX was developed by Donald Knuth as a typesetting system. It was created before the advent of home computers with high processing power, such as the Archimedes, and thus, in its bare form, does not really fit in with the high resolution, multi-tasking world of the machine. Nevertheless, *ArchiTeX* (the Archimedes version) does go a certain way to fitting in with the Risc OS environment.

The main difference between *TeX* and a desktop publishing system such as Acorn *DTP*, is that *TeX* has no graphical front end. All input – both the actual text and the layout control, is contained in a file. *TeX* then acts rather like a compiler, turning your 'script' file into a 'DVI' (DeVice Independent) file that can then either be previewed on screen, or sent to a printer.

In addition to the simple setting of text in paragraphs, *TeX* can deal with such things as footnotes, foreign characters, odd shaped paragraphs, diagrams and even complicated mathematical equations.

In fact, this represents only a small fraction of what is available. *TeX* itself is a complex programming language allowing variables, looping, conditions and macros.

Not everyone is cut out for such low level coding and so a standard set of 'useful' macros loads as a default. This has almost everything the average punter needs.

Using ArchiTeX

If you buy the complete system (*ArchiTeX* and the font designing program, *Metafont*) be prepared for a bit of a shock as you'll get 16 800K floppies! Sorting through these can be a bit of chore, but both programs can be easily installed on a hard disc or Econet. Although you can run the system off floppies, a large storage media (or even a big Ram disc) is a definite boon.

There are three stages to creating a finished document. First you must prepare the script file. This can be done in any text editor such as *Twin* or *!Edit*.

The special features of *TeX*, such as layout control and mathematics are accessed through a series of escape sequences, usually prefixed with a backslash. This file should then be saved.

The *TeX* processor should then be loaded. Although this is compatible with the desktop, it takes control of the whole screen and does not multi-task. Interestingly enough, TooLs has provided a multi-tasking shell program (rather like *!Edit* task windows) that allows *TeX*, and other programs – even the Basic Editor – to multi-task.

On loading, *TeX* prompts for the name of your script file and then chunters away processing it. Any errors or comments are reported on screen and written to a log file. Finally, with any luck, it will save the resulting DVI file.

To preview or print this, it must be loaded into the DVI processor. This is a true multitasking Risc OS application. Menu options are provided for loading DVI files, setting up the output mode and telling the application where the fonts are. All being well, after a few clicks and whirrs, your document should appear fully typeset on screen or on the printer. Easy eh?

'the difference between TeX and a desktop publishing system is that TeX has no graphical front end'

A similar process is used by *Metafont*. Again, unlike the usual Archimedes way of

defining fonts, *Metafont* uses its own language to precisely describe the way characters should be drawn.

I think the main problem with the *TeX* system is that it needs its own set of fonts – it is not possible to use any of the outline fonts supported by the Risc OS font manager. The whole program is thus rather on the large and cumbersome side and I wouldn't like to have to run it off floppies.

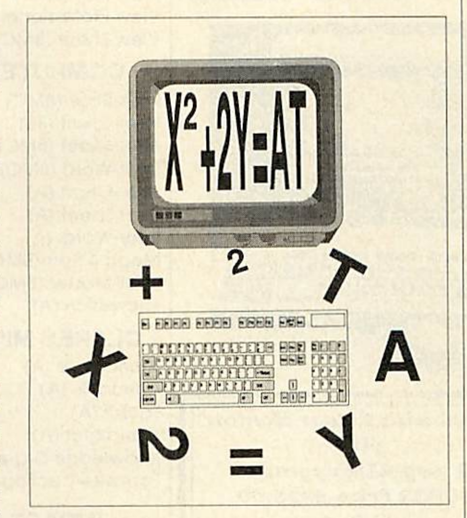
Saying *TeX* is a departure from the usual methods of DTP is wrong, as it has been around a lot longer than the page and frame system described above. However, this does not mean that it is outdated. Many large institutions such as universities use it and it is an ideal system for a mainframe with text only terminals attached to it.

'if you want unlimited flexibility or to typeset highly technical documents then I cannot recommend TeX enough'

Moving from a system such as Acorn *DTP* to *TeX* is a big jump, and not one that should be taken lightly. You'll lose the ability to import *!Draw* and *!Paint* files into your finished documents for a start. However, if you really need the practically unlimited flexibility it provides or need to typeset highly technical documents, then I cannot really recommend *TeX* enough.

ArchiTeX itself seems to be a good implementation of *TeX*, and despite a few quirks, such as menu text you can delete, it functions as one would expect. It is also very cheap for such a powerful system. Perhaps someone will write a DVI to *!Draw* converter, so that *TeX* could be used for setting mathematical equations which could then be included in *!Draw* or *!DTP*.

One final point: Don't buy *ArchiTeX* assuming you'll be able to read the manual and instantly know all there is to know about *TeX*. The manual is provided as an installation guide and brief introduction to *TeX*. For any real information on the *TeX* language, you'll have to refer to any of the books listed below. I personally recommend Knuth's own tome, *The TeXbook*.



The TeXbook by Donald E Knuth, published in 1984 by Addison-Wesley. *LaTeX: A Document Preparation System* by Leslie Lamport, published in 1985 by Addison-Wesley. *The Joy of TeX* by Michael Spivak, published in 1985 by Addison-Wesley.

ArchiTeX and *Metafont* cost £114 each from TooLs, Kessenicher Strasse 108, D-5300, Bonn 1, FRG.

ALL IN ORDER

An obscure bit of modern maths is made clear for **DAVE FUTCHER** by a package for Longman's Numerator

The story of chaos begins in the early 1960s with the work of the meteorologist and mathematical sophisticate Edward Lorenz who set up a simple experiment using a computer to program various changes in the rising of hot air.

In a nutshell, the Choas theory says that regardless how simple or complex a recurring phenomenon is, its occurances have no predictable order, yet there is a form of order that exists in chaos.

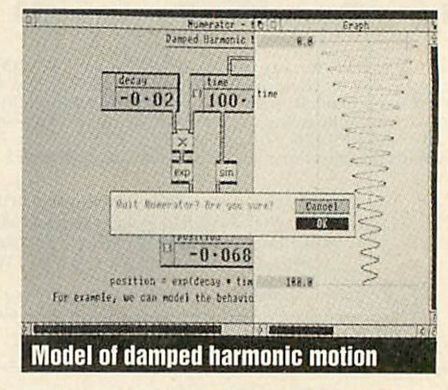
What Lorenz discovered was that tiny differences in the initial data could result in enormous differences in the outcomes – which could create chaotic outcomes.

Lorenz created the first picture of the science of chaos when he graphed the results of his experiement in three dimensions. The result was a 3D spiral-like curve that never intersected or repeated itself. It became known as the Lorenz attractor.

A strange attractor is the general term for this shape occurring in the chaos theory. It can be graphed in multi-dimensional space. The strange attractor changes constantly, endlessly looping and yet never exactly repeating itself.

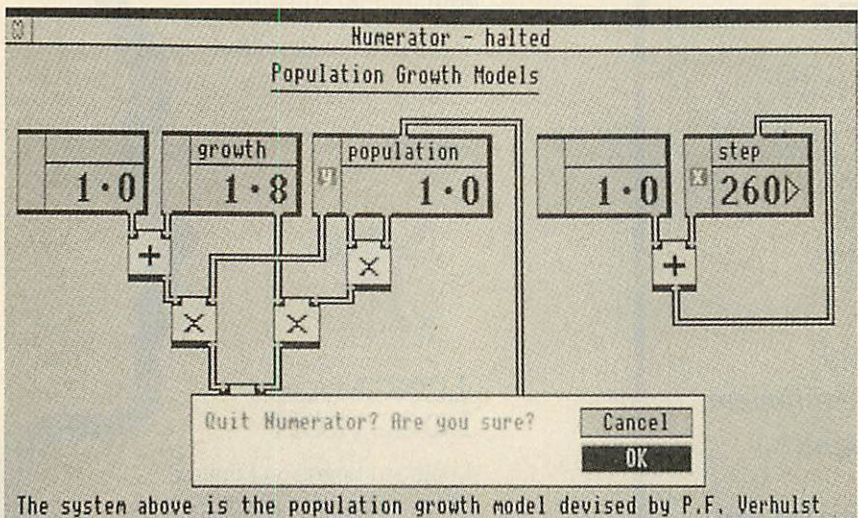
It was not until the 1970s that other mathematicians and scientists began to find similar results, especially when computers were used for modelling information.

The studies undertaken were from a wide spectrum of fields that seemed totally unrelated – recorded floodings of the Nile, earthquakes, noise disruption of electrical current on telephone lines, fluctuations in the price of cotton, changes in celestial orbit, insect infestations in Australia.



Model of damped harmonic motion

But the results were astonishingly similar – the strange attractor surfaced over and over again.



Malthusian populaton growth

Understanding chaos

The science of chaos is at a threshold. In pursuit of the chaos theory an entirely new type of scientific experimentation has evolved where mathematics is the major means of exploration in a laboratory harboured inside a computer.

In 1987 James Gleick set out to shine some light into the whole world of the growing discipline of chaos theory by writing an outstanding popular paperback, *Chaos: Making of a New Science*.

It was a book that many people said would change our attitudes to how the world works! It certainly jolted many perceptions and shook up the scientific world.

As a concession to 'innumerate' readers Gleick avoided any serious discussion of mathematics, concentrating on pictures and personalities.

Logotron has now set out to remedy this deficiency with the publication of the *Order and Chaos* pack which uses the *Numerator* software package running on an Archimedes or the BBC A3000 computer.

Numerator is already well respected mathematical construction kit software (the

8-bit version won the *BBC Acorn User* award for Best Educational Software). It was written by Peter Hunter and first published in 1989.

It allows children and students to explore and experiment in the world of numbers, using a graphic medium which makes 'number crunching' stimulating and fun.

The flexibility and openness of *Numerator* has made it an appropriate tool for all sorts of investigations with numbers. It has been particularly successful in providing the environment in which teachers and their pupils have explored arithmetic, probability, statistics, trigonometry, iterative methods and approximations.



The Julia set is a complex pattern

The Order and Chaos pack

The *Order and Chaos* pack contains a copy of the James Gleick book, some investigations prepared on disc and a first-class workbook taking you through the possibilities for exploring the workspaces created.

The mathematical workspaces have already been created using the simple elements that are at the heart of *Numerator*. Number Tanks hold values, Processors hold the operators in calculations and Pipes link together the Number Tanks and Processors to create a working model.

There are three workspaces on the theme of population modelling. These are based on the population growth model devised by P F Verhulst in 1845 which is a variation on the Malthusian equation, and they illustrate the ideas of period-doubling and bifurcation diagrams.

Harmonic_1 and Harmonic_2 use damped harmonic motion as a vehicle for illustrating the idea of phase space maps. In these workspaces the behaviour of a swinging pendulum is modelled.

> **'Not chaos-like, together crushed and bruised;**
> **But, as the world harmoniously confused;**
> **Where order is variety we see;**
> **And where, though all things differ, we agree.'**
>
> *Alexander Pope*

Michael Henon was involved in research about orbits around the Galactic centre and he computed the intersection of an orbit with a plane.

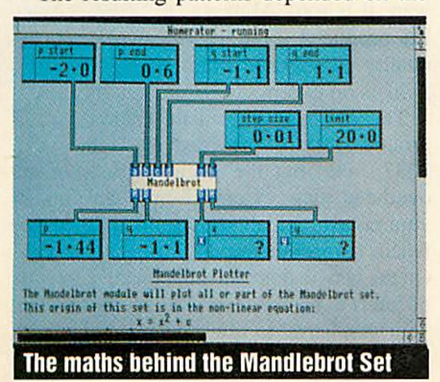
The resulting patterns depended on the system's total energy. The Henon workspace demonstrates a particular attraction function he discovered.

The workspace F_Triangle uses a module Fract_Tri which generates a fractual triangle built up of randomly placed dots. The position for each dot is determined by a rule which contains a random element.

In the Mandel_Lab workspace it is possible to experiment with the non-linear equation at the heart of the Mandlebrot set. While MandelPlot will plot all or part of the Mandlebrot set.

This works rather slowly and therefore a separate application *!Mandel* has been provided on the disc to provide for investigation into the Mandlebrot and Julia sets outside of *Numerator*.

The final two workspaces, PlanetWrks and 4StarWorks allow you to explore the butterfly effect within two-dimensional, astronomical environments, bringing together chaos and cosmos.



The maths behind the Mandlebrot Set

Conclusions

Interest in 'chaos' has grown dramatically in the last few years. With its *Numerator* software and this *Order and Chaos* package, Logotron will open the eyes of anyone who feels they would like to begin their own exploration of unpredictable non-linear systems.

Although the author, Peter Hunter, has provided the models and the 'recipes' for starting off the exploration, much is left for your own adventures into the dazzling world of chaotic behaviour.

This is a great marriage of James Gleick's brilliant book and a computer program. It will certainly enhance the appreciation of the subject for a wider audience and free it from the province of the specialist scientist and mathematician.

The Order and Chaos *pack for* Numerator *– software, workbook and the book,* Chaos: Making of a New Science, *by James Gleick costs £15. To run the software a copy of the Archimedes version of* Numerator *is also necessary. This costs £69 from Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: (0223) 323656.*

GAME

There's good news and bad news this month. The good news is that things are looking up for the Archimedes and good sales of the BBC A3000 have encouraged software houses to take a closer look at the wonder machine.

The bad news is that the number of games for the old Beeb seems to be decreasing in direct proportion. The only companies supporting this machine are Superior and Fourth Dimension, with one or two 'one-offs'.

One game that will see the light of day on the Beeb (and perhaps the Arc) is *Klax* from Domark. Best described as a kind of 3D *Tetris*, *Klax* is being released alongside its coin-op version.

The game is something of a cross between *Breakout* and *Connect Four*. You must bounce tiles around a grid to make lines of three. The game progresses with more lines (Klax's) to make, like *Tetris*, faster and faster action. We'll have a full review soon.

The Fourth Dimension is doing its best with *Inertia* (hopefully out by now) and the eagerly awaited conversion, BBC *E-Type*.

Based loosely on the classic *Marble Madness*, *Inertia* puts you in charge of a spinning-top like craft which you must guide around a tiled landscape.

Various tiles have to be collected in order to proceed, some of which affect the way in which your ship manoeuvres. An Archimedes version, with enhanced graphics and digitised music, should be out some time in June.

Other Arc games on the horizon are *Nevryon* (see the Beeb review in last month's issue) and *Man at Arms*.

Nevryon is a 'total' shoot-em-up type of game while *Man at Arms* is a more thought-provoking fantasy arcade adventure.



Man at Arms: a thought-provoking fantasy adventure


Battle Tank: another gem from Minerva

The main bastion of the Beeb, Superior, continues to support the machine and following the tie-in with French company Infogrames (reported last month) should have a steady flow of new releases in the coming months. *Hostages* and *Sim City* both look likely on the BBC, with Arc versions following soon afterwards.

Incidentally, rumour has it that Infogrames is, at this moment, working on Arc games. Don't say I didn't warn you.

While on the subject of rumours, how about this list to get your tongues hanging out – *Starglider*, *Ghosts and Goblins*, *Elite II*, *Grand Prix Construction Set* .... The list goes on but that's enough for this month.

Oh, I almost forgot. The number of games playable on the Archimedes could go up to several thousand overnight, in the not too distant future, and I'm not talking about Arxe System's Spectrum emulator....

To round off this month, I've got a couple of cheats to keep you going. For all those with Domark's *Empire Strikes Back* classic, the end is now in sight. Just press f6 followed by f0 on the title screen and get blasting. Thanks to Robert Davis of Surrey for that one.

Hot off the presses comes a cheat/handy hint for the spanking new *Apocalypse* from Fourth Dimension. Planet hopping can be made a lot easier with the following programette from Alan Davies of Cheshire.

```
*MOUNT
*DIR !Planets
X%=OPENUP "HST"
L%=EXT #X%
PTR #X%=L%-1
BPUT #X%,8
CLOSE #X%
```

Put a backup copy of the *Planets* disc in the Arc and type the lines, as shown, at the command line. You'll now be able to visit any of the nine planets at leisure.

Tune in next month, where *Manchester United Football*, *Hostages* (hopefully) and 'anything else we can lay our hands on' get the once over.

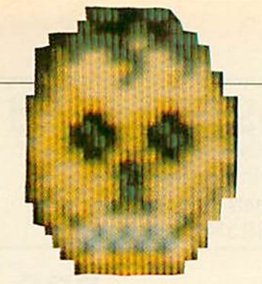
Rob Miller

Battle Tank

Minerva Software; tel: (0392) 437756
Archimedes/A3000 £14.95

For a company which claims its main priority is business software (and excellent business software it is too), Minerva has produced some high quality games, and *Battle Tank* is no exception.

The standard implausible background story is provided (It is the year 2037... etc) but the game consists of an overhead view of a high-tech tank under your control which you use to activate defences to repel the occupying enemy forces. On the way to this ultimate objective, plenty of fun is to be had feverishly trying to align your gun barrel to teach the baddies a loud and violent lesson.



SHOW

Scrolling of the birds-eye view is smooth and flicker free and sampled tank-tracks and explosions have been implemented to good effect. There is a large playing area on each of the four levels, filled with many different, if not inspiringly innovative or original graphics.

There are some neat shading effects on some of these which add depth to the otherwise rather two-dimensional terrain.

Some constructive criticism to be levelled at the game is the poor handling of the tank itself. Although it has both forward and reverse controls for both tracks, it tends to embed itself all too readily into the surrounding shrubbery. Perhaps a simple left and right rotation coupled with an overall forward/reverse control would be better.

Another minor gripe is the fact that any tanks you hit go up in flames but fail to disappear from the screen for a long time, with their main fuselage remaining and blocking your path.

The score is nicely superimposed onto the main battle ground but the instructions are displayed in an eye-straining military-style font which is difficult to read at the best of times, let alone amidst explosions and other distractions.

Chris Cullen has produced a worthwhile addition to your games collection, even if it could do with a few improvements.

Mat Tizard

Bug Hunter/Moon Dash

Minerva Software; tel: (0392) 437756
Archimedes/A3000 £17.95

New from Minerva comes a two game compilation that seems to be slightly less than the sum of its parts. In exchange for your hard-earned cash you get the amusing *Bug Hunter* and the not so stunning *Moon Dash*. The former is a sort of arcade adventure and revolves around the efforts of the small but deadly 'Hysteron-Proteron' to rid the universe of insects.



I defy anyone to suppress a chuckle after loading it, when our hero begins to jive endearingly! He is the result of a botched genetic experiment, in which the scientists, instead of creating an eight foot killing machine, end up with a six inch bipedal invertebrate with a silly face.

This is the character you play, in his exterminatory excursions around a house, a school and a factory.

Each of the 30 locations is pleasantly illustrated in 16 colours and some nice background touches such as a poster depicting the latest Arnie Schwarzenegger film – *Decorator* – add to its charm. It is possible to skip levels by means of a password-entry system.

Hysteron, or HP for short, has no weaponry of his own, and so has to rely on whatever comes to hand; milk bottles, cogs, helium balloons, and even a vase.

What he does have, though, is sucker feet, which allow him to walk up walls and under table-tops. Among his adversaries are spiders, cockroaches, bees, beetles and an unidentifiable slimy creature, all of which relentlessly follow him wherever he hides. If he does well, he gets a medal which is pinned to his snout, if not, he is dropped down a chute in a great bit of animation. The game's hi-score table is saved to disc with each new entry, and apart from the grating music, *Bug Hunter* is light-hearted and enjoyable. Nice to see a game with a sense of humour.

...Pity it's forced to share a disc with *Moon Dash* though. This is the black sheep in the *BMX on the Moon* dynasty, and consists of 16 levels of nicely drawn but poorly animated graphics in the familiar 'jump the rocks, and blast the green guys' mould.

To be fair, *Moon Dash* can become quite frantic and exciting in its later screens, and the background changes as you progress, but the dreaded system sound-effects are here again in force and that sealed the fate of the game in my opinion .

In all, I'd say £17.95 was a bit steep for a package of such patchy quality, but it's probably worth it just for the Schwarzenegger gag!

Mat Tizard

Maddingly Hall

Minerva Software; tel: (0392) 437756
Archimedes/A3000 £14.95

It is 1932, and Bertie Hall is a hapless gambler who has lost all his money on the GGs and refuses to work for a living. This has lead to something of a financial crisis so he resolves to visit his rich aunt Agatha, a lady of staunch Victorian values, at Maddingly Hall to sponge off her for a weekend.

This is the intriguing background to the new Minerva graphic adventure, again from the CPU of Chris Cullen, the man responsible for *Battle Tank* amongst other things.

The plot thickens when we discover that Bertie's childhood sweetheart, Veronica is also at the Hall along with several doddering aunts and uncles as well as an eagle-eyed butler who sees and knows all.

Our hero decides to try to regain favour with his aunt, who disapproves of his irresponsible lifestyle, to get her to write him back into her will and leave him the money with which to woo the lovely Veronica.



Maddingly Hall: has a quaint charm

It's a convoluted background, I know, but what of the game itself? Well, not a lot actually. This is the author's first stab at an adventure, and frankly it shows. It is written in Basic which should mean a slower but more sophisticated parser. This is not the case. The speed is fine but the game is of the VERB – NOUN class of adventure and sometimes not even up to this since it has a very limited vocabulary.

Impressively, every single location is illustrated (instead of just the usual few pictures) but sadly, at the cost of using sprite-based graphics which get re-used all over the game. I think the Forsythia shrubs proliferate in almost every outdoor location!

The objects in the game are sparingly detailed and do not stand up to detailed 'examination' – just producing the standard 'you notice nothing unusual' response. There are no pronoun routines to allow use of 'it', 'them' or 'everything'.

Having said all that, it is unfair to compare this enjoyable game with more expensive, coded and converted games such as *Fish* or *Jinxter*, and *Maddingly Hall* has a quaint charm about it which will provide a welcome diversion to the less fussy adventurers out there, who don't mind the occasional 'I don't understand...' message.

Mat Tizard

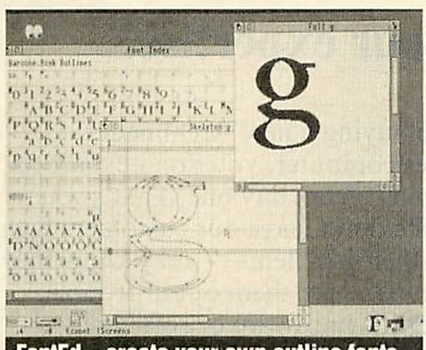
FREE AND EASY

GRAHAM BELL takes a further look at some software that won't break the bank

Last month, we looked at several small programs to make the most of your Archimedes. In particular, these aid data transfer and add new facilities to the Arc's desktop. This month, there's a few major applications and some more 'decorative' programs.

Perhaps the most impressive application you can bag 'for free' is *QRT*, *Quick Ray Tracer*. This is available from Norwich Shareware disc 21. It is a complete ray tracing package, with a scene-description language similar in scope but different from expensive commercial packages like Clares' *Render Bender*. There's a group of sample files which can be traced – including a number illustrated in *BAU* over the last few months. There's a 'comprehensive' manual which is little more than a description of the facilities of the scene language – not for beginners, but for an experienced programmer, or someone with an idea of the basic principles of ray tracing, it's about adequate.

Where the application falls down is the support for animation – *Render Bender* can take a sequence of separate images and compress them into a short animation, but there's no facility within *QRT* to do the same. One great benefit is that it can render a picture 'in the background'. You can have



FontEd – create your own outline fonts

QRT working away on the desktop while you wordprocess, without it making too much difference to the speed you can work at. It gradually builds up the picture in whatever screen resolution and size you specify, and automatically saves the picture when it's finished. This is a boon because it can take all day to render a full screen, high-resolution, 256-colour image!

Acorn makes some good applications available via SID, its Support Information Database. While material on SID is not public domain (it remains Acorn copyright material), the software is essentially free, and SID is a valuable source of non-commercial software.

The least known software on SID is probably *FontEd*, the editor that allows you to create your own Acorn-type outline fonts. Anyone contemplating using this tool should realise that even one new typeface is a major task requiring several weeks of full-time commitment.

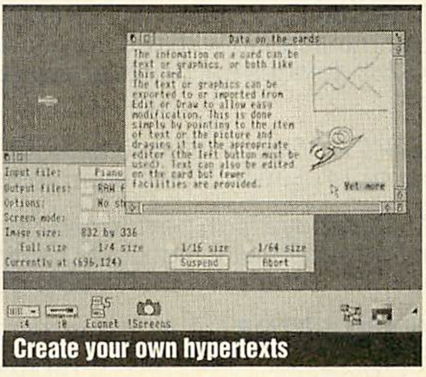
The font editor allows you to set up a new typeface, or to alter details of the existing faces like Trinity or Corpus. Altering the existing faces is not particularly useful, unless you want to add a complete new character for dot-matrix or Laserjet printers – any modifications you make can't be printed out via Postscript.

A new character can be drawn in a similar way to using *!Draw*, by drawing lines with the mouse and dragging the control points of curves to get them exactly right. The important part of the process is inserting 'hints' to make sure that each letter in your new typeface will look readable on screen in all the different screen modes, and will maintain its shape even when printed out small.

A new face can be used immediately you install it in your !Fonts directory and reboot. And you can use it on any screen, or dot-matrix or Laserjet printer. Beware though: when you do use your font, the document can't be used by anyone else unless they have the font too.

Want to try out 'hypertext'? This year's buzzword is used to describe several Arc products, Musbury Consultants' *Bookbinder*, Longman Logotron's *Hyperbook* or even the more sophisticated *Genesis* from Software Solutions. These allow you to create pages of written information, illustrated with sprite pictures. Clicking on a sprite or section of text can lead you to any other page, giving more details. A hypertext document need not be read linearly – from page 11 to page 12 – but can be approached in a less structured and more flexible way. Learning is more like a process of exploration than conventional reading. But is hypertext for you? You can get a flavour of what the fuss is about for free, with the *Hyper* application on APDL disc A31 which lets you both read example documents and create complex hypertexts of your own.

David Pilling distributes several affordable Arc utilities, mostly derived from public domain Unix programs. In particular there's the *Spark* archiving utility that can compress files as they are stored. This costs £5.99 on Pilling's disc 16. It's invaluable for backing up your hard disc and minimising the number of floppies you need. Acorn's SID and many other bulletin boards



Create your own hypertexts

use *Spark* to compress their downloadable files to reduce the transmission time and thus reduce your phone costs. So you'll often need to unpack *Spark* files. *Sparkplug* is the unpack- only version, and it's stored (uncompressed!) on SID itself. It's the first thing you'll need to get hold of. All you do to unpack telesoftware is drag the downloaded file onto the *Sparkplug* icon; it presents you with a window showing the uncompressed files and you can drag these into any normal disc directory window.

Tiny animals infest Arc!

Crabs, fish, a moose, a bloke with a red pullover, a lone pair of eyes... Arcs can play host to a menagerie of sorts. While the beetle-browed 'serious hacker' might look upon these programs as frivolous, they can be used to make the micro seem cuter, less inhuman and forbidding to newcomers. The fish swim about the grey desktop background, hiding behind the windows and blowing bubbles. The eyes stare relentlessly at the mouse pointer. And the cartoon-character Bullwinkle the Moose pops up occasionally to remind you to 'get on with it'. All the public domain software libraries have versions of these available.

PD is often fun, often useful, and occasionally so completely without merit that you just want to reformat the disc. But it's free – or nearly so – and is sometimes just the job, so it's worth checking out the sources listed last month and below. Almost anything you want is there.

David Pilling, PO Box 22, Thornton, Cleveleys, Blackpool, FY5 1LR.

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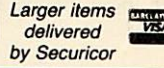
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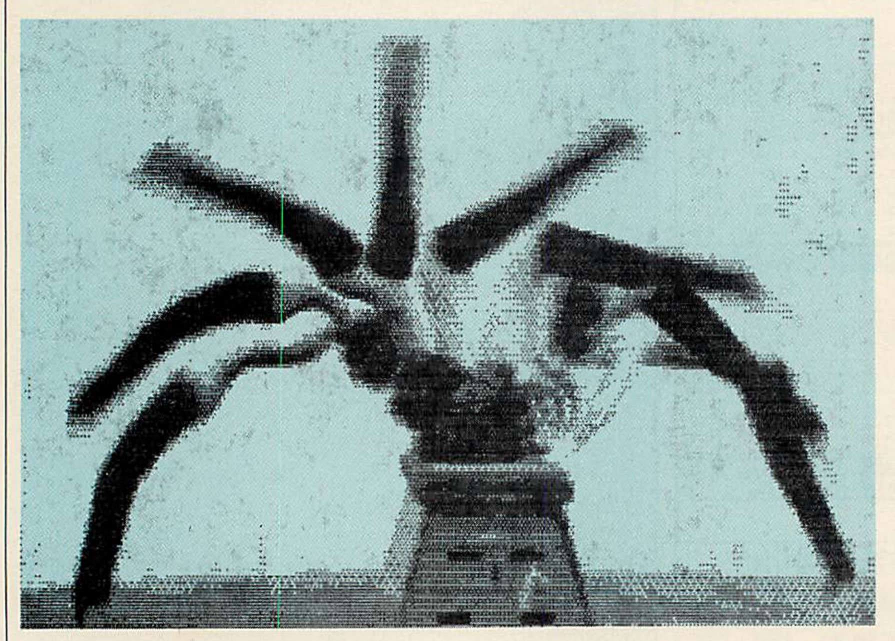
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MOTION PICTURES

ELIZABETH BURNS speaks to Southport teacher, Jerry Murland, who uses the school's Arc in gym classes



Jerry Murland used his school's share of the latest Education Support Grant monies to purchase a Watford video digitiser to plug into their Archimedes 310. He says, 'I'll be honest, we fancied making some money at the Christmas Fair by taking pictures of people and printing them out using the computer.'

This was, he confesses, a good gimmick and a successful way of generating funds for Christ the King School in Southport, but it wasn't really what his local education authority had in mind when it handed over the cheque.

What Jerry needed was an educational use for the digitiser, preferably in a subject area which wasn't the traditional preserve of information technology and, if possible, involving pupils at the lower end of the secondary age range.

The solution he eventually came up with was to take the digitiser along to PE lessons in order to help gymnasts analyse their vaulting techniques.

'I wanted to film a sequence of frames as the gymnast performed a vault and superimpose the sequence to make one picture which could be used to evaluate the vault and to indicate where he or she was going wrong.'

Jerry found the Watford Digitiser very easy to use. Once it is installed and a suitable camera plugged in, the command *SEE produces instant and impressive results. It's then a simple matter to save pictures, transport them into art or graphics packages and play around with them.

Any video camera will do, according to Jerry, and the simpler it is the better. Christ the King School's camera had a phono plug and the podule has a bayonet socket, but soldering a new phono socket alongside was no problem.

The Christmas followed by the summer fairs had given Jerry some useful experience in processing the images. He explained that the digitiser works with 64 shades of grey and these are converted to 16 shades for mode 9 screens.

The initial problem was that no white showed up on the pictures and so a great deal of detail was lost.

However, the digitiser can ignore the lightest shades and can spread the remaining ones across the full range. If you do this, the grey background turns white and the gymnast can then be seen quite clearly on the printout.

Jerry says, 'Adjusting the 'threshold' above which the light shades are ignored is just like changing the contrast control on the TV and results as good as a pen and ink sketch from a few feet can be produced.'

In fact the grey background on the picture shown here was removed using a different method. He continues, 'By using the pattern editor to read the lighter shades as pure white and to brighten up the darker shades, large black patches are avoided which, if nothing else, saves a great deal of wear on the printer ribbon!'

Another of the digitiser's facilities is the ability to superimpose one picture on top of another. Jerry used this to replace one frame by another only where it was darker. Therefore, when the gymnast was filmed against a light background, the background didn't register and the gymnast's legs, clothed in dark leggings, showed up clearly.

Jerry and his pupils were able to get useful information from the printouts. In the one shown here, for instance, they could see that the gymnast 'peaked' a little late and needed to get her body vertical quicker.

'When we tried this in a second year lesson,' says Jerry, 'we found it instructive to produce the multi-frame image for a skilful gymnast and discuss it with the class.

'We then tried the exercise with the rest of the class. Each pupil was given the opportunity to be filmed and to analyse the faults in technique. At virtually the first attempt we were able to demonstrate instant improvement.'

The software to drive this application was written by Jerry himself, using ideas from the programs which come with the digitiser. It is quite short and will run either 'live' with a camera or from a video tape.

At the press of a key, the digitiser starts 'grabbing' frames as the gymnast reaches the springboard and is about to vault. The Arc then grabs and stores frames as fast as it can until the memory is full. This is about nine full-size or more than 20 quarter-size frames. Jerry says half a dozen are usually enough for the purposes of analysis.

The future Olympic medallist can then sequence through the frames, choose the first and last, and the computer merges them to produce a multi-frame image.

Printing out presents no problems and not only have the gymnast's technique and prospects improved, she or he has a souvenir of the coaching session. Jerry concludes, 'The results, though a bit fuzzy, are proudly claimed by the people involved and produce effective displays.' The LEA is no doubt happier about the use its funding is being put to too!

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